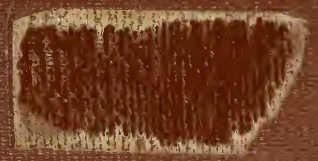

Report of the Thirty-Sixth National Conference on Weights and Measures

U. S. Department of Commerce

National Bureau of Standards

Miscellaneous Publication 202

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Report of the Thirty-Sixth National Conference on Weights and Measures

Attended by Representatives from Various States

Sponsored by the National Bureau of Standards
Washington, D. C., May 22, 23, 24, and 25, 1951

National Bureau of Standards Miscellaneous Publication 202

Issued December 10, 1951

For sale by the Superintendent of Documents, U. S. Government Printing Office
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Official photograph of delegates and guests attending the Thirty-Sixth National Conference on Weights and Measures, assembled at the National Bureau of Standards.

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U. S. Food and Drug Administration:
SUMNER C. ROWE, Chemist, Food Division, Washington 25, D. C.
U. S. Ordnance Ammunition Center:
R. O. RASK, 209 Hunter Street, Joliet, Ill.
U. S. Treasury Department:
FRED W. GAST, Chief, Division of Engineering and Weighing, Bureau of Customs, Washington 25, D. C.

GUESTS REPRESENTING MANUFACTURERS OF WEIGHING AND MEASURING DEVICES

American Can Co.: ALFRED STEINER, Technical Assistant, 100 Park Avenue, New York 17, N. Y.
Baldwin-Lima-Hamilton: MALCOLM L. HALL, Manager, Test Equipment Department, Philadelphia, Pa.
Black & Decker Manufacturing Co.: E. E. POWELL, Manager, Loadometer Department, Towson 4, Md.
Bloomer Brothers Co.: RAYNOR M. HOLMES, Research Engineer, Newark, N. Y.
Borg-Erickson Corporation: L. H. ERICKSON, 469 East Ohio Street, Chicago, Ill.
Bowser, Inc.:
IRVING W. BALDWIN, Manager, Mid-Atlantic Region, 830 Washington Building, Washington 5, D. C.
W. M. HARKS, Vice President, Oil Equipment Division, Fort Wayne, Ind.
Brodie, Ralph N., Co., Inc.:
DON KINGSLEY, 550 South Columbus Avenue, Mount Vernon, N. Y.
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Chatillon, John, & Sons:
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MRS. CARRIE G. WOODLAND, Representative, Woodland's Temple Grove, Fellsmere, Fla.
Erie Meter Systems, Inc.: PAUL R. FISHBURN, Erie, Pa.
Exact Weight Scale Co.:
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JAMES F. SULLIVAN, Chief Engineer, 944 West Fifth Avenue, Columbus 8, Ohio.
Ex-Cell-O Corporation:
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Gilbert & Barker Manufacturing Co.:
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Gould Equipment Co.: EARLON W. BARRETT, Representative, Portland, Maine.
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Hanson Scale Co.: STAN L. HANSSEN, President, 523 North Ada Street, Chicago 22, Ill.
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Marathon Corporation:
WILLIAM S. NORDBURG, Menasha, Wis.
BEN A. RAFOTH, Menasha, Wis.
L. E. SUMERL, Menasha, Wis.
Martin & Schwartz, Inc.:
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Marvel Rack Manufacturing Co., Inc.:
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National Store Specialty Co.: WALLACE E. SHEAFFER, President, Bareville, Pa.
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Stimpson Computing Scale Co.:
FRANK M. DOYNE, Eastern General Distributor, 468 Weaver Street, Larchmont, N. Y.
JOHN J. WAAGE, President, 829 Logan Street, Louisville, Ky.
Streeter-Amet Co.:
ROBERT T. ISHAM, Superintendent of Production, 4101 Ravenswood Avenue, Chicago, Ill.
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Tokheim Oil Tank & Pump Co.: WILLIAM E. LOUTHAN, Service Manager, Fort Wayne, Ind.
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Association of American Railroads: Millard A. Pinney, Engineer of Tests, Test Department, Pennsylvania Railroad, Altoona, Pa.
Baltimore & Ohio Railroad Co.: E. Kent Lawrence, General Scale Inspector, Maintenance of Way Department, Baltimore 1, Md.
Cannon Mills: Herbert A. Greene, Scale Superintendent, Kannapolis, N. C.
Chicago & Northwestern Railway System: Harry Mayer, Engineer of Scales and Work Equipment, 400 West Madison Street, Chicago 6, Ill.
Dixie Cup Co.: Arthur J. Nolan, Vice President, Easton, Pa.
Food Fair Super Markets: Bernard N. Siegel, Vice President and General Manager, 1420 Seventh Street NW., Washington, D. C.
Lilly, Eli, & Co.: Edward V. Meith, 740 South Alabama Street, Indianapolis, Ind.
Esso Standard Oil Co.:
Nelson Friz, Construction and Maintenance Assistant, 15 West Fifty-first Street, New York, N. Y.
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Great Atlantic & Pacific Tea Co.:
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Liquid Tight Paper Container Association: Arthur W. Howe, Jr., Assistant Executive Secretary, 1532 Lincoln-Liberty Building, Philadelphia, Pa.

Lockport Cotton Batting Co.: Richard M. Archibald, Executive Vice President, Lockport, N. Y.
National Association of Popcorn Manufacturers: Thomas J. Sullivan, Executive Vice President, 110 North Franklin Street, Chicago 6, Ill.
National Association of Scale Manufacturers: Arthur Sanders, Secretary, 1129 Vermont Avenue NW., Washington, D. C.
Ohio Injector Company: Harry G. Smith, Vice President, Wadsworth, Ohio.
Paper Cup and Container Institute, Inc.: Dale H. Eckerman, Executive Director, 1790 Broadway, New York 19, N. Y.
Phillips Petroleum Company: D. D. Buttolph, Technical Representative, Bartlesville, Okla.
Safeway Stores, Inc.:
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Edgar Balshaw, Division Manager, 1845 Fourth Street NE., Washington, D. C.
Luther S. Beale, Employee Relations Manager, 1845 Fourth Street NE., Washington, D. C.
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Joseph W. Upton, Office Manager, 1845 Fourth Street N. E., Washington, D. C.
Burton R. Warner, Advertising Manager, 261 Constitution Avenue NW., Room 522, Washington, D. C.
Dudley J. Weymer, Retail Operations Manager, 1845 Fourth Street NE., Washington, D. C.
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Shell Oil Co.: J. V. Hazen, Division Engineer, 3706 Eighty-second Street, Jackson Heights, Long Island, N. Y.
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Southern Railway System: J. N. Todd, Superintendent of Scales and Work Equipment, Office of Chief Engineer, Washington 13, D. C.
Southern Weighing & Inspection Bureau: Alfred J. Reynolds, General Supervisor in Charge of Weighing and Weights, 511–101 Marietta Street, Atlanta, Ga.
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Thread Institute, Inc.:
John Bell, Chairman, Legislation Committee, 11 West Forty-second Street, New York 18, N. Y.
David Snyder, Executive Director, 11 West Forty-second Street, New York 18, N. Y.
Union Pacific Railroad Co.: Omar L. Heggem, General Scale Inspector, Denver, Colo.
U. S. Steel: Charles Bauer, Scale Shop Foreman, Gary Sheet and Tin Mill, 328 West Ridge Road, Gary, Ind.
Visking Corporation: William M. Sawers, 6733 West Sixty-fifth Street, Chicago 38, Ill.
Western Weighing and Inspection Bureau: E. M. Curl, Supervisor of Weights, Room 460, Union Station, 517 West Adams Street, Chicago 6, Ill.

MISCELLANEOUS GUESTS

E. C. Crittenden, 1715 Lanier Place NW., Washington, D. C.
R. W. MacLean, Director, Standards Division, Department of Trade and Commerce, Ottawa, Canada.
Alex Pisciotta, 419 Stockholm Street, Brooklyn, N. Y.
Ragnar Schlyter, Director and Chief of Statens Hantverksinstitut, The Royal College, Stockholm 4, Sweden.
Wael Tawam, Director, Bureau of Standards, Ministry of National Economy, Damascus, Syria.
Hon. John Russell Young, President, Board of Commissioners, District of Columbia, Washington 4, D. C.

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REPORT OF THE THIRTY-SIXTH NATIONAL CONFERENCE ON WEIGHTS AND MEASURES

SPONSORED BY THE NATIONAL BUREAU OF STANDARDS, AND HELD AT THE WARDMAN PARK HOTEL, WASHINGTON, D. C., MAY 22, 23, 24, AND 25, 1951

FIRST SESSION—MORNING OF TUESDAY, MAY 22, 1951

(J. T. Kennedy, Vice President, and C. A. Baker, Vice President, presiding)

INVOCATION

The invocation was delivered by R. W. Searles, Deputy County Sealer of Weights and Measures, Medina, Ohio.

ADDRESS OF WELCOME

Hon. John Russell Young, President, Board of Commissioners, District of Columbia, extended to the delegates and guests a very cordial welcome to the City of Washington.

MEMORIAL SERVICE FOR DECEASED MEMBERS

In accordance with a resolution adopted by the Thirty-fourth National Conference, R. W. Searles conducted a very appropriate memorial service.

ADDRESS BY DR. E. U. CONDON, DIRECTOR, NATIONAL BUREAU OF STANDARDS, AND PRESIDENT, NATIONAL CONFERENCE ON WEIGHTS AND MEASURES

[Dr. E. U. Condon addressed the Conference in some detail concerning the part the National Bureau of Standards is playing in the national defense program. He described some of the more extensive Bureau activities in this field and told of how these newer responsibilities had increased tremendously during the past few years. He concluded his remarks with the following summary of the developments taking place in weights and measures circles throughout the Nation during the past year.]

As you all know, on October 31, 1950, R. W. Smith, formerly Chief of the Office of Weights and Measures and Secretary of this Conference, elected to retire from Government service after more than 30 years of duty with the National Bureau of Standards. Mr. Smith was a gentleman of outstanding ability who exhibited untiring devotion to duty; his retirement has been felt in more ways than one and has added greatly to the responsibilities of W. S. Bussey, who succeeded him. We know that this loss in weights and measures circles has been felt throughout the nation, as well as at the Bureau of Standards. We understand that Mr. Smith has been enjoying his well-earned retire-

ment, but we are sorry that he is not in Washington at this particular time in order that he might be in attendance at this Conference.

The Office of Weights and Measures has continued its program of participation in State and regional weights and measures conferences and schools of instruction. Staff members have taken advantage of every opportunity to make personal visitations to State and local weights and measures offices. We have also endeavored to meet every request for counsel and advice upon technical and administrative problems presented by State and local weights and measures officials.

We regret to announce that John L. Dahlrot, formerly in charge of one of our railway track scale testing units, resigned from the Bureau staff on April 25, 1951. Mr. Dahlrot accepted a position in the Scale Department of the Louisville and Nashville Railroad, with headquarters at Louisville, Ky. We wish him well in his new work. D. V. Smith, who has been identified with the railway track scale testing program of this Bureau for many years and who has recently been on limited duty as a result of a service-connected injury, has been reexamined and found to be sufficiently recovered to assume full-time duty. We are pleased to announce that Mr. Smith is taking over the operation of the testing equipment previously in charge of Mr. Dahlrot.

We are glad to announce at this time the appointment of Malcolm W. Jensen, City Sealer of Weights and Measures for the City of Madison, Wis., to the staff of the Office of Weights and Measures. Mr. Jensen will serve as assistant to Mr. Bussey, filling the vacancy that has existed since Mr. Bussey succeeded R. W. Smith. We are confident that Mr. Jensen's background of education and experience, and his personality, enthusiasm, and sincere interest in weights and measures administration, thoroughly qualify him for the duties he is about to assume. As most of you already know, Mr. Jensen is present at this meeting, and we hope that those of you who are not already personally acquainted with him will make it a point to get acquainted during this Conference.

The work of revising the Bureau publication on Federal and State Laws on Weights and Measures has proved to be quite a task and has consumed considerably more time than was originally anticipated. We are glad to announce, however, that the publication has progressed to the very last stages. The type-setting job is completed and the page proof has been approved. The matter of indexing this large book has proved to be a big job. However, the indexing is nearing completion at this time.

Work on the Weights and Measures Case Book has been again delayed during the time Mrs. Kathryn Schwarz has been necessarily engaged in the indexing of the law book. She expects to resume work on the case book in the near future.

We had hoped to announce that the newest and last National Bureau of Standards Handbook in the weights and measures series had been completed and that it would be available for distribution at this Conference. I refer to Bureau Handbook 45, Testing of Measuring Equipment. This Handbook was written by R. W. Smith with the cooperation and assistance of numerous persons in various phases of weights and measures work. We think that it is a very valuable publication and, if studied and used by weights and meas-

ures officials and others, it should prove of untold value in improving uniformity and efficiency in this field. We hope that this Conference will go on record as adopting this Handbook, as its official recommendation for use in the various jurisdictions, the same as was previously done in connection with Handbook 37, Testing of Weighing Equipment. The price of this publication has been set at $1.25 by the Government Printing Office.

It is our purpose in conducting the affairs of the Office of Weights and Measures to render every possible assistance to State and local weights and measures offices. It is our desire to encourage and assist you in doing an increasingly better job. We solicit your comments and suggestions as to how we might render a more constructive service in this field.

There have been several changes in the heads of State weights and measures departments during the year. In Idaho, Carlyle Smith has replaced L. A. Thompson as Chief Inspector, Division of Weights and Measures, Department of Agriculture, at Boise. In New Jersey, after serving for many years as Deputy Superintendent and Acting Superintendent, Joseph G. Rogers was promoted to Superintendent, Division of Weights and Measures, Department of Law and Public Safety, at Trenton. In North Dakota, A. J. Jensen, who has been a regular participant in this Conference for many years, was elected to the office of State Insurance Commissioner and has been replaced as Chief Inspector of Weights and Measures, Public Service Commission, at Bismarck, by J. C. Goll. In Texas, Phil Ford was replaced by Francis L. Goode as Chief, Division of Weights and Measures, Department of Agriculture, at Austin.

Probably the outstanding single development during the year was accomplished in the neighboring State of Maryland, where a comprehensive weights and measures law, based upon the proposed revised version of Form 2 of the Model State Law as contained in the current Report of the Committee on Legislation, was passed by the Legislature, and signed by the Governor on May 7. The bill is to become effective on June 1, 1951. You will hear more of the details of this law later in the program. I do want to say, however, that the National Bureau of Standards is proud of this constructive effort in Maryland, and we are happy that our Office of Weights and Measures was permitted to have a small part in this successful accomplishment. I want to publicly commend A. Morton Thomas, Director, Department of Inspections and Licenses, Montgomery County, for his efforts and efficient leadership as Chairman of the Maryland Weights and Measures Association in bringing about the passage of this law. I also recognize and commend the constructive work that was done by Dr. H. L. Stier, Chief, State Department of Markets, Board of Agriculture, University of Maryland, at College Park; George H. Leithauser, Senior Assistant Superintendent, Weights and Measures Division of the City of Baltimore; and all others who participated in this program. This reduces from six to five the number of States that do not have reasonably comprehensive weights and measures laws. We trust that, as the years go by, this number will continue to be reduced.

A weights and measures bill, based upon Form 2 of the Model State Law, was also introduced in the Colorado Legislature. We are informed, however, that this Legislature adjourned without passing the bill.

Numerous weights and measures jurisdictions throughout the Nation, including both State and local, have continued to improve their testing equipment and laboratory facilities during the year. The outstanding examples of improved testing equipment are prevalent in the fields of large-capacity scales, vehicle tanks, and wholesale liquid-measuring devices. The number of instances where modern equipment has been purchased are too numerous to mention. However, we do commend all jurisdictions involved for the progress which they have made.

At this time I announce the committee appointments which are necessary. Appointments are necessary on all of the standing committees of the Conference, since last year completed the leveling off of committee memberships to the standard number of five, which was adopted by this Conference several years ago. On the Committee of Specifications and Tolerances, the term of George F. Austin, Jr., of Detroit expires this year. I am appointing as his successor, for a 5-year term, Robert Williams, County Sealer of Weights and Measures for Nassau County, New York. Mr. Williams has a long record of attendance and active participation in this Conference, and has made an outstanding record in conducting the affairs of his department. This will also maintain the desired balance on this important Committee of having one city, one county, one National Bureau of Standards, and two State representatives serving together. I am confident that Mr. Williams' stewardship upon this Committee will be pleasing to all concerned.

On the Committee on Methods of Sale of Commodities, the term of J. F. Blickley of Pennsylvania expires this year. To replace Mr. Blickley upon this important committee, I am appointing J. E. Brenton of California.

On the Committee on Legislation, we have two vacancies to fill this year. The term of J. A. Bernard of St. Louis, Mo., expires, and J. R. Booth, of Haverhill, Mass., has resigned his membership on the Committee because of retirement from the office of City Sealer of Weights and Measures as a result of ill health. We are extremely sorry that it has been necessary for Mr. Booth to take this course. He has been a devoted weights and measures officer for a number of years, and his presence and active participation in our Conferences will be missed. We wish for him speedy and complete recovery. To replace Mr. Bernard, for the 5-year term on this Committee, I am appointing R. M. Bodenweiser of Mercer County, New Jersey. To replace Mr. Booth, for a 3-year term, I am appointing V. D. Campbell of Ohio.

On the Committee on Education, the term of Robert Williams expires, and I am appointing for a 5-year term Howard E. Crawford of Jacksonville, Fla. Mr. Crawford is now serving as Chairman of the Committee on Education of the Southern Weights and Measures Association, and I feel that this should establish a very desirable liaison between these two Committees.

On the Committee on Trading by Weight, the term of F. G. Cesar of Oklahoma expires this year, and I am appointing, for a 5-year term, J. W. Reese of Iowa.

I appoint two Committees to act during the 36th National Conference.

1. On the Committee on Nominations, I appoint J. A. Boyle of Maine, Chairman; J. E. Brenton of California; C. D. Baucom of North

Carolina; R. E. Meek of Indiana; H. E. Howard of Miami, Fla.; C. C. Mundy of Richmond, Va.; and L. E. Witt of Milwaukee, Wis.

2. On the Committee on Resolutions, I appoint R. W. Searles of Medina County, Ohio, Chairman; E. R. Fisher of Rhode Island; J. J. Levitt of Illinois; Miles A. Nelson of Michigan; A. C. Samenfink of Rochester, N. Y.; J. Fred True of Kansas; and E. C. Westwood of Salt Lake City, Utah.

ROLL CALL OF STATES

The Chairman called the roll of States. Delegates from 33 States and the District of Columbia responded. All delegates were introduced individually.

ROLL CALL OF STATE AND REGIONAL WEIGHTS AND MEASURES ASSOCIATIONS

The Chairman called the roll of State and Regional Associations of Weights and Measures Officials. Representatives of 17 of the 18 Associations on record responded.

(Written reports from several States and Associations were mimeographed and distributed at the Conference.)

A REPORT FROM THE NATIONAL SCALE MEN'S ASSOCIATION

By J. H. Downer, *Secretary, National Scale Men's Association*

(*Presented by* E. M. Curl, *Past President, National Scale Men's Association*)

The National Scale Men's Association appreciates the opportunity to be represented on your program. After all, the craftsmanship of scales is one of the oldest.

Scale craftsmanship has come a long way, down through the centuries. A trade that was once most jealously guarded, and so retarded, is more and more improving and being perfected, perhaps from the lifting of the veil of secrecy and a closer cooperation of all parties involved.

We believe the National Scale Men's Association in Article One of its Constitution and By Laws gives in just a few words an explanation of its possible aid to progress and improvement. It says, "The Objects of the Association are (a) To secure the cooperation of all concerned in matters of scale design, scale construction and installation and scale maintenance and weighing, and (b) To bring about discussion of everything pertaining to scales and weighing, the prime object being to bring about by education an improvement in scale construction, in methods of maintenance and in weighing practices."

Our Association has a membership of about 400 and consists of the parent organization and twelve local divisions. They extend from the Great Lakes to Southern California.

The activities of the local divisions vary. For example, one group is interested in compiling educational information. Strange as it may seem, there is less printed information—literature and textbooks—on scales than almost any other subject. Here we have an entire industry—world wide and definitely boundless in scope—with no class organization in any recognized trade school. Yet scales play an im-

portant—even critical—part in every single industry from mining to pharmaceuticals, and from our first to last day on earth. We are weighed at birth, and the embalming fluid injected in our remains is weighed. Still, no school sees the need for class work in a subject so important. We hope, through the local division and the parent National Scale Men's Association, to change this condition.

The three organizations together can do much in their united efforts. These three are The National Scale Men's Association, your own Conference and the National Bureau of Standards, and the National Association of Scale Manufacturers. Cooperation is necessary in any and every endeavor. It benefits all concerned, individually and collectively. If you tell George what you know, and George tells you what he knows, both you and George are better equipped, both theoretically and practically.

We are three separate and distinct groups—ours to install, service, and maintain; yours to act in regulatory capacities; and the National Association of Scale Manufacturers to build. Legislation is important and determines the work of the other two—but there are very definite limitations on man and materials, so cooperation of all three is necessary for a satisfactory, workable, and practical finished picture. If we all will continue to cooperate and publicize our work, we cannot help but to grow.

Again, thanks for inviting us to be a part of your Conference and a sincere hope that it will be the same success it has been in these past many years.

SCROLL FOR NATIONAL BUREAU OF STANDARDS

Mr. J. E. Brenton. You have been told that this year will mark the fiftieth anniversary of the National Bureau of Standards. Your Executive Committee, by unanimous vote, has authorized the Secretary to purchase a scroll commemorating this fiftieth anniversary in order that it may be presented tomorrow. I move that the Conference approve the action of the Executive Committee and authorize presentation of this scroll to the National Bureau of Standards.

(The motion was seconded, the question was taken, and the motion was agreed to.)

(The Conference was recessed until 2 p. m.)

SECOND SESSION—AFTERNOON OF TUESDAY, MAY 22, 1951

(V. D. Campbell, Vice President, presiding)

REPORT OF THE NATIONAL CONFERENCE COMMITTEE ON TRADING BY WEIGHT, PRESENTED BY J. FRED TRUE, CHAIRMAN

Investigation by this Committee has revealed that there are two strong groups which are concerned with the matter of doing away with the bushel as a legal measure. One group is composed of the grain trade, which does not want any change. The other group is the feed and seed trade, which would like to do away with the bushel and use only the pound, hundredweight, or ton in buying, pricing, and selling their products.

Before a complete change from the use of the bushel to pound, hundredweight, or ton can be accomplished, both of these groups will need to be in complete accord and work together on this matter.

There is an ever-increasing use of weights in trade and less use of the bushel or other dry measures. This Committee would like to have all weights and measures officials encourage this trend where possible.

We recommend that all Federal and State crop reporting agencies use, where possible, weight rather than dry measure in their reports.

We recommend that, where possible, the various States abolish legal weights per bushel on seeds and feeds, whether mixed or unmixed.

We recommend that manufacturers of farm machinery be encouraged to mark seed charts which are put on, or are attached to, seeding machinery to show the pounds of seed per acre rather than the bushels or pecks of seed per acre.

We feel that the Committee should be continued so that it might offer assistance to industry where possible, and promote through the States the trading by weight on all seeds, feeds, and grain. It is felt that the Committee might carry more weight if its recommendations are approved by the National Conference so that it will have the backing of all jurisdictions.

(The report of the Committee on Trading by Weight was adopted by the Conference.)

WEIGHTS AND MEASURES SERVICE IN CANADA

By R. W. MacLean, *Director, Standards Division, Department of Trade and Commerce, Ottawa, Canada*

I was somewhat reluctant to accept the kind invitation to address this Conference on the activities of the Standards Division in Canada. While I was honored by the invitation, I recalled the diffidence of Dr. Condon at your meetings in 1946 when he admitted to some knowledge in the field of physics, but stated frankly that in the field of

weights and measures, he was a very ignorant beginner. Not only am I an ignorant beginner, but unlike Dr. Condon, I can lay no claim to engineering or technical skill. However, in my defense I can say that there is a difference in our Canadian organization which permits the Director to be other than an engineer. Thus, the head of our administration is one of that profession which so seldom sticks to its own last—a lawyer.

Canada has not been officially represented at your discussions since 1931, and, since a review of our activities may be of interest, I shall confine my remarks to a general rather than a technical outline. If, however, we are again invited to participate, I would be glad to arrange for some of our technical staff to take part in any discussion to which your organization committee feels they could make some contribution.

I may say that we have been well posted on the problems that have been discussed at the various Conferences in the intervening years, and our own administration has been greatly strengthened by the excellent material that has come to us. In addition, bulletins issued from time to time by the National Bureau of Standards and the various State organizations have been of great value. Then, too, in dealing with specific problems, we have received willing and useful advice from States that were or had been concerned with the same problems. To reciprocate, we would gladly place at your disposal the experience we have had or the facilities we operate if these can be of value to any of you.

The organization of the Weights and Measures Service in Canada has undergone some slight changes since the time any official report has been published. In 1947, it was incorporated into the Standards Division of the Department of Trade and Commerce, which had been created to place under one administration those inspection services dealing with commercial measurement, whether of weights and measures, electricity or gas. This consolidation has enabled the Canadian Government to effect a worthwhile saving by way of administrative overhead, for while inspection techniques are not identical, the same procedures and administrative routines are common. As a matter of interest only, I might mention in passing that further duties have been assigned to the Division in the development of commercial commodity standards, and we are the regulatory authority for the export of electricity, gas and oil. These latter two functions are, as you will appreciate, very broad in concept, and as time goes on will considerably expand the work of the Standards Division. If any delegates are interested in the aspects of our work other than weights and measures, I shall be glad to cover the ground with them at some more informal time.

Turning specifically to weights and measures, I do not think it does us any harm to recall how deeply rooted the service of weighing and measuring is in the history of mankind. I have read quotations from the Bible, which take weights and measures well back into antiquity. You will recall that in Deuteronomy it is decreed: "Thou shalt not have in thy bag divers weights, a great and a small"—that is, I presume, a heavy one to buy with and a lighter one to sell by. This points up the basic spirit and intent of weights and measures throughout the ages. With such biblical guidance and injunction, it is little wonder

that our forefathers took great pains to ensure that weights and measures were included in the law of the land. Legislation from the earliest times has always endeavoured to deal with this essential accompaniment to fair practice in commercial operations. The basic charter of mankind's human rights, set out under circumstances with which you are familiar, and included in the Magna Carta of 1215, is an outstanding example. This document, as you will remember, provided in part that "there shall be one measure of wine throughout our kingdom, and one of ale, and one measure of corn, to wit, the London quarter, and one breadth of dyed cloth * * *. And as with measures so shall it be also with weights."

Such interest by our forebears was not without great justification. Weights and measures are fundamental to any organized society, and there is little doubt that, under a profit system and the stress of intensive competition, without weights and measures inspection the temptation to manipulate devices for a price would quickly reduce business to a state of chaos. Not only in internal operations, but also in external contacts, are sound concepts of weights and measures vital. By maintaining the accuracy of the units of the pound, the yard, and the gallon as used by Canadian manufacturers and producers, uniformity is largely maintained in relation to the weights and measures of the British Commonwealth and the United States, and in recognized scientific relation to the metric standards used by other countries. It has been upon this basis alone that international trade could function, prosper, and progress.

With such a fundamental role in the commercial world, very definite responsibilities must be shouldered. Over the years, the gradual acceptance of this inspection service, in many instances not without some heart-searchings, makes it necessary for us to be always looking to the future in our methods of operation. No service should permit itself to become satisfied with a static type of operation, for if it does technological advances will inevitably date these methods.

Feeling as strongly as I do about the role of Weights and Measures, perhaps I might be permitted to outline what I consider to be the fundamental policies underlying any weights and measures administration. I shall do this as briefly as I can, and then outline our historical background and the policies presently in force in Canada, which will indicate, I think, that we have made considerable progress toward achieving a sound, workable service.

The foremost need, of course, is that provision should be made for the establishment of basic standards of length and mass, and to ensure that derived standards are continually reverified to ascertain the continuing limits of accuracy. Flowing from this is the need to translate and maintain these standards to commercial operations, accurately and uniformly. Only by so doing is it possible to maintain equity in all commercial determinations of quantity. In securing such equity, constant vigilance must be observed over the preliminary approvals of equipment and its subsequent check when used in trade. Lastly, with an efficient, well-trained staff, it is necessary to exercise supervision over trade generally for the prevention, detection, and prosecution of persons using equipment unjustly or engaging in short weight practices. I think it goes without saying that any weights and measures inspection service that contents itself with the inspection of scales

without regard to spot scale inspections and short weight supervision is spending money to no purpose.

Prior to Confederation in Canada, each province had its own system of weights and measures. The British-North America Act of 1867, by which our Confederation was established, specifically vested jurisdiction over weights and measures in the central authority. The system in use was naturally the English system transplanted, with an admixture of some old French measures in use in the Province of Lower Canada, now Quebec. What might be termed the principal Weights and Measures Act of Canada was passed in 1872–73. Patterned on the English system, it established the pound, the gallon, and the yard as the legal standards for Canada. It provided that all commercial transactions must be in terms of these standards, or the metric equivalent. One major exception, of course, is that the practice of weighing gold or other precious metals in terms of the Troy ounce was permitted to continue. Of interest is the fact that two historic measures were carried into the new system—the old French land measure, the arpent, and the long ton. All seignorial lands had been surveyed by the arpent, and it can be assumed that any change presented insurmountable difficulties. The long ton in mining operations had a common usage which it was felt need not be disturbed. In adopting the English system, however, one beneficial change was made: in place of the cumbersome system of stones, quarters, and hundredweights, a decimal series was legalized.

Our primary standards are maintained by the National Research Council. The Departmental, or derived, standards used in the Weights and Measures Laboratory to verify the field or working standards are calibrated by National Research Council metrologists in terms of the primary standards. At least annually, and we are working toward a shorter period, these field or working standards in the hands of inspectors are recalibrated by our own personnel.

The vesting of complete jurisdiction in the federal authority has many distinct advantages. The most important, of course, is that throughout the Dominion of Canada there is one central body which approves the type of equipment which may be used for trade purposes, and that inspection techniques in our 22 divisions are, in the main, identical. It is therefore possible for any manufacturer who has obtained approval for equipment to know that after factory inspection it will be accepted from the Atlantic to the Pacific, and that it will be subject to the same methods of inspection when in commercial use.

While I shall endeavour not to bore you with too many administrative details, I could perhaps sketch quickly the history of any piece of equipment which a manufacturer may wish to sell in Canada. In the first instance, if it is to be used for trade purposes, it must receive type approval. We maintain in our laboratory several engineers and skilled technicians who are competent to investigate the device from the point of view of construction, material content, and ability to perform within required limits. The device is subjected to rigorous testing, and if found satisfactory is listed for approval as a trade device. This advice is sent to the manufacturer, and of course passed also to our field staff for information. If there is any particular with respect to the construction or points to be watched in inspection,

this information is also included. Once approval has been secured, the manufacturer is free to manufacture and sell, provided the device is manufactured to type and passes factory inspection. The same procedure is in force for manufacturers outside of Canada who wish to sell devices in Canada. It is possible for the Division to maintain control over equipment manufactured in other countries, since the Customs Department of the Federal Government extends every cooperation in advising our district officers when shipments of weighing or measuring equipment are being held for clearance. It is standard practice that such equipment will not be cleared from customs until approval has been given by the Weights and Measures Service.

From time to time we find it necessary to have greater technical research done than our own staff may be equipped to handle. In this event, we consult with the appropriate division of National Research Council, whose activities and abilities are probably fairly well known to you. We therefore feel that in the approval operations we are well able to handle any problems which come before us.

At this point, I might say that we require weighing and measuring equipment to be marked. Every device approved for trade use is given a designated marking, and all others, regardless of type, shape, capacity or otherwise, which do not meet our requirements must be marked "Not Legal for Trade." I know that this latter point has given some concern to manufacturers, but I may say that we insist on such marking without exception.

We have encountered one specific difficulty, and that is the initial, or factory, testing and stamping of static measures. These are largely mass produced, and the majority may never see trade use. We are adopting a procedure whereby a manufacturer may submit a prototype. This is examined, and if it meets our requirements, he may then proceed to manufacture and stamp it legal for trade, and it may be so used. Conversely, if it is not submitted or does not meet requirements, it will bear no marking and will be illegal for trade. For static measures, we do not attempt complete factory inspection, but rely on field inspection. Control in trade use is maintained in that those properly marked, which are found to be inaccurate in the field, can be traced to the manufacturer, while those unmarked which are found on trade premises are promptly seized. In either instance, necessary action is taken against the offender.

At this stage, if I may, I should like to draw to your attention particularly that of any manufacturers present who may export to Canada, that sales by volume in Canada must show the Canadian measure. You will be aware of the differential in our pints, quarts, and gallons, due to the difference in the primary standard gallon. While we insist that volume be shown in Canadian terms, we do permit U. S. or other terms to be shown as well. But in whatever terms the volume is shown, the Canadian equivalent must also show. As the U. S. ounce is larger than the Canadian, we have not strictly enforced this requirement where volume is designated in U. S. ounces.

From the most recent report of our operations, our field inspection staff of 109 traveled a total of 737,000 miles, calling at 141,000 places of business, where they inspected 450,000 pieces of equipment. This included calls on every conceivable kind of business establishment, and covered the inspection of the known range of trade devices.

Our Weights and Measures Service operates on a fee system which produces a revenue about equal to our expenditures. Our actual operations are provided for by a vote from Parliament, and we must keep within this limit. The revenue from fees forms part of the general revenues of Canada, and is not credited to our Service. While I shall not argue the merits for or against the fee system, I shall merely say that we have found that the advantages outweigh the disadvantages, and that no change is under consideration.

Those of you who are familiar with the geographical areas of Canada will readily appreciate that our field inspection problems are great. Where there are large concentrations of population, the work can be done easily on a properly scheduled basis. Outside of these, our difficulties are numerous. It has always been the policy that, regardless of location, Canadian citizens are entitled to the protection which the Weights and Measures Act provides. Therefore, it is necessary for our inspectors to travel far afield, at considerable expense and not inconsiderable inconvenience. For example, in our newest province, Newfoundland, the commercial and industrial activity is centered largely in St. John's, Cornerbrook, and Grand Falls. The balance is located in small communities on the coast which are accessible only by boat. Since the introduction of the Weights and Measures Service in Newfoundland, we have operated a sea-going vessel for nine months of the year to reach these various outports. While in normal circumstances it is mandatory to inspect trade equipment once a year, we have permissive authority to do this on a biannual basis where warranted. Therefore, in this province we shall cover the south coast and part of the northeast coast one year and the remaining coast and the coast of Labrador the next. Similarly, we have thriving communities in the Northwest Territories which are accessible only by air, and here also we face such factors as inconvenience and high cost of travel, with little or no revenue.

You may be interested in the experience of one inspector, traveling to James Bay which, as you know, is at the most southerly point of Hudson Bay. The inspector covered the greater part of the trip by railway, and the engineer was good enough to make his stops at each successive station sufficiently long for our man to inspect the equipment located along the line. Amazing to me personally was that this same inspector found it possible to cover several out-of-the-way stores in a canoe. I am hopeful that this latter type of transportation will not become too extensive, for since canoeing experience is not a requirement to enter our Service, we may find ourselves faced with high replacement costs of equipment.

In addition to the annual inspection of scales, which is undoubtedly important, there is the complementary task of ensuring that such equipment is properly used, and we do extensive checking in this direction. Short weight, as you are undoubtedly aware, is a statutory offense under the Weights and Measures Act. It provides in part that "* * * Any person who sells, delivers or causes to be sold or delivered anything by weight, measure or number short of the quantity ordered or purchased shall be guilty of an offense * * *"—and he may be fined or imprisoned or both. The proven fact of short weight is alone enough to secure conviction. The ques-

tion of intent, or as we lawyers say, "mens rea", is only considered on the quantum of the penalty. One problem in connection with short weight has been giving us some concern: that is the growing practice of selling prepackaged articles with no weight indication. While a measure of control is maintained under other federal acts which require an indication of contents, the Weights and Measures Act goes only to the extent of prescribing that if weight or volume is shown, it must be in terms of Dominion weight or measure. However, our Weights and Measures Act is before parliament for revision, and an appropriate section has been drafted to provide necessary control. The present requirements of our Act, coupled with others such as the Food and Drugs Act, the Meat and Canned Foods Act, the Fish Inspection Act, and others, do cover a good many products where the consuming public may be imposed upon, but leave gaps which should be closed. For example, the Food and Drugs Act, which controls the activities of manufacturers or producers, makes it mandatory that they mark the weight or volume of prepacked articles, whereas a retailer packing the same article on his own premises has no such responsibility under the Weights and Measures Act. However, despite this and other difficulties, the control of prepacked articles is good, and there is every cooperation between the enforcement sections of the various departments concerned. When our own authority is complete, over-all protection against short weight should be possible.

While, due to the great area of Canada, it is not possible that inspectors be always present to prevent malpractices, yet, as in the case of all law, fear of detection and prosecution and the grave injury such adverse publicity does to any business provides an excellent protection for the public in the guarantee of honest weight or measure.

As I mentioned, we endeavor to have identical inspection techniques in the various divisions. To this end, we maintain a handbook of inspectional techniques which is carried by every inspector. While inspections may vary from district to district in some respects, we at least ensure that the basic essentials are covered. We consider it also of great importance that inspectors be properly trained before they are permitted to deal directly with the public. Like so many other organizations, our Weights and Measures Service encountered recruitment problems during the war and postwar years. To rebuild the Service, we are aiming toward an initial training program for new inspectors to supplement instructions now given by the individual District Inspectors in the field. While it is important that inspectors know inspectional techniques, the construction of equipment, and what exterior factors may affect equipment, I personally consider it most important that they first know what the standards they carry represent and, second, the care with which equipment should be used. You will all be familiar with the care taken in the custody and use of primary standards, and this care should be no less in the hands of an inspector. I think you will agree that mutilated or dirty test weights or measures do not inspire self-confidence in the inspector, nor confidence or respect in traders for the inspector, the service he renders, or the service he represents. It appears to me that the best way to convey this to new inspectors is by permitting them to see the primary

standards and the comparisons which are made from time to time. At the same time, it is possible to give new inspectors some of the basic principles of physics and mechanics which will stand them in good stead in actual field work.

Any new inspector commencing with our Service comes on a probationary basis only. It is possible that there is thus some wastage of training in new men who do not prove satisfactory, but we feel that we are building a strong inspection staff by keeping only those men who have shown initiative and adaptability to the work. For those who do show these characteristics, we must, on our part, provide some incentive for them to advance in the Service. From your own experience, you will be aware that there are inspectors who will never be more than average. There is a place for these, but there must be some incentive for the ambitious inspector. Canada is divided into 22 Weights and Measures Divisions. In each of these we have a District Inspector, who is the senior man at that point. At the field level, therefore, we have 22 senior posts which become vacant from time to time. There are also senior technical positions in the laboratory and senior administrative positions at the head office. We have, in addition, provided for upward reclassification of those inspectors who are willing to apply themselves. The highest class is that of Senior Inspector, and to attain this category an inspector must have a minimum of five years' service, must have given complete satisfaction, and must have passed a fairly stiff written examination covering the more theoretical side of the work. To broaden the background of inspectors, we encourage round table discussions at district offices for several periods a month, at which the staff discuss new techniques or develop answers to field problems which they may be encountering. Thus we feel that our organization provides broad opportunities of advancement for the inspector who can maintain his zest for the work.

In the maintenance of high inspectional standards, it is, of course, very necessary to keep abreast of new manufacturing techniques and to improve inspection techniques as circumstances warrant. Our technical staff are continually investigating present methods with a view to improvement, or testing untried techniques which may prove satisfactory in our work. Any new developments are immediately passed to the field staff for adoption. In this connection, we have been doing considerable testing over the past three years with an experimental heavy duty test truck, with a view to acquiring a fleet to meet the requirements of the Service. You will appreciate that our problems in this development are not simple when you recall the areas to be covered; roads varying from excellent to poor, particularly those in remote areas which at times become completely impassable; temperature variations from extreme summer heat to extreme winter cold; the dust of farmlands to the snow of our Canadian winter. Our unit, which is a 12-ton sealed load, has given good service, and in addition to providing material for a decision on type, has enabled us to give a kind of testing service on heavy duty equipment which is outstandingly good and has been the subject of much favourable comment from industry.

In this short review of our activities, I trust I have been able to give you some picture of our operations, the standards we try to maintain, the goals to which we are pointing. All phases I have mentioned—

approval of equipment, annual inspections, short weight, and unjust scale inspections—are, in my opinion, a benefit to the whole community. The manufacturer is protected against unfair competition and the sale of shoddy, cheap, and inferior devices. The trader is protected against the purchase of inferior equipment, the mechanics and material of which he in most cases does not understand, and is further protected against unfair competition through the use of false weights and measures, and the practice of short weight. Closer to home, he is protected in the event that he is giving, by inadvertence, overmeasure or overweight. The public is protected against deception and short weight.

A periodic review of these objectives, and the means of attaining them, are, I know, the fundamental purposes of this Conference. While my technical contribution has been negligible, perhaps on the other score I have been able to justify your kind reception of my remarks. I am the more appreciative of the honour of the time allotted to me since, contrary to biblical injunction, I shall receive much more than I have been able to give.

WEIGHTS AND MEASURES EDUCATION IN ENGLAND

By W. H. Tough, *Sanitary Scale Company, Belvidere, Ill.*

In opening this address, I am reminded of a statement made by the then British Controller of the Standards, R. J. Trump, in an address he gave at the County Hall, London, 20 June, 1924.

> The Acts under which the Inspector works contain many purely administrative clauses, which, although adequate legal advice may be available, if wanted, he must himself be able to interpret satisfactorily upon the spot. There are, however, technical sections, not to speak of the Regulations, where he may have to rely almost wholly upon his own interpretation so far at least as his immediate action is concerned. He must, therefore, be a man of fair education, able to appreciate the meaning of a legal phrase and even to distinguish its finer shades. In the work of testing, he needs to have an intimate knowledge of the instruments he is handling and of the possibilities of mechanical processes, and he must himself possess some fair degree of manipulative skill. To adjust his working standards, he must be able to use precise apparatus to advantage. To say that his integrity must be above suspicion is to demand no more than is expected of every public official.

Although this statement was made more than a quarter of a century ago, it is just as true today.

Let us first of all consider the statutory requirements of a candidate to be examined for the Board of Trade Certificate to act as an inspector of weights and measures:

The Weights and Measures Act, 1904 (4 Edw. 7 ch 28), which came into operation on the first day of January 1905, contains the following provision:

> 8.—(1) The Board of Trade shall provide for the holding of examinations for the purpose of ascertaining whether applicants for the post of Inspector under a local authority nominated by that authority possess sufficient practical knowledge for the proper performance of the duties of Inspectors of Weights and Measures, and for the grant of certificates to persons who satisfactorily pass such examinations.
>
> (2) A person shall not be appointed to act as an Inspector of Weights and Measures unless he has obtained such a certificate as aforesaid, and the appointment of any person as inspector made after the commencement of the Act of 1889, but before the commencement of this Act shall, unless before

the commencement of this Act he has obtained a certificate under Section Eleven of the Act of 1889, be null and void.

(3) If any person not being an Inspector duly appointed under the Weights and Measures Acts, acts as such Inspector, or if any person having been appointed an Inspector after the commencement of the Act of 1889 acts as an Inspector without having obtained a certificate either under Section Eleven of that Act or under this section, he shall be liable to a fine not exceeding ten pounds, or in the case of a second or subsequent offence, twenty pounds.

This examination, which is open to all candidates duly nominated by a local authority, is usually held twice a year and generally occupies three successive days.

There are three main points of interest here:

1. That the Board of Trade is the examining body on a national basis.
2. That no person is permitted to act as an inspector of weights and measures unless he is duly qualified and in possession of the Board of Trade Certificate.
3. A candidate has to be nominated by a local authority.

These statutory requirements immediately set a pattern for a training program. The subjects under which a candidate is to be eventually examined are as follows: English composition, arithmetic and mensuration, mechanics and physics, weighing and measuring practice, acts of Parliament and regulations, together with a practical and oral examination.

The first two subjects act more or less as a guide to the basic fitness of the candidate, for if failure is found in these two groups, then it is without doubt an impossibility to find success in the subjects to follow.

We will now examine closer the other subjects by looking at the syllabus of the examination:

MECHANICS AND PHYSICS

A knowledge of the definitions of mass, weight, force, velocity, acceleration, momentum, energy, work, power, and equilibrium. The ability to solve problems in the combination and resolution of forces, the determination of centres of gravity, moments and stresses in simple frames.

A knowledge of the laws of friction between solid surfaces and calculation of the reaction of hinges and supports.

The principles of simple machines including the lever, pulley, inclined plane, screw, and eccentric cam.

A knowledge of the principles of hydrostatics and of the methods of determining density and specific gravity. The principle of pumps and syphons. The simple properties of the atmosphere and the construction of barometers and pressure gauges.

A knowledge of heat and temperature including the properties specific and latent heat and the expansion of solids, liquids and gases.

The construction of thermometers and the conversion of different temperature scales.

WEIGHING AND MEASURING PRACTICE

A knowledge of the mechanical properties of the metals and alloys, and of the common protective treatments applied to these materials. The common methods of heat treatment and fabrication of metals.

The construction and principles of action of the recognized general types of weighing and measuring appliances. Beam scales, counter machines, steelyards, dead-weight machines, compound lever machines, crane machines, automatic weighing and delivering machines. Accelerating and vibrating machines, sensitiveness and error, self-indicating and semiself-indicating machines, and pendulum indicating devices generally.

Measuring pumps and other liquid measuring apparatus. Leather measuring machines, planimeters, etc.

The criticism of special types and patterns: General knowledge of the notices of patterns examined by the Board under Section 6 of the Weights and Measures Act, 1904. Ability to interpret simple mechanical drawings, plan, elevation, and section.

Construction and use of the vernier, micrometer, beam compass, callipers, comparator; methods of weighing, intercomparison of a set of weights; construction, care and use of fine balances, and inspectors' standards and equipment generally.

ACTS OF PARLIAMENT AND REGULATIONS

Nothing is gained here by a repetition of the various acts and regulations of which the candidate is supposed to have a sound knowledge. It is enough to say that the candidate will be examined:

1. In the provisions of the several acts of Parliament relating to the duties of an inspector of weights and measures, and as to proceedings to be taken in case of prosecution under the acts.
2. On his knowledge of the regulations made under the acts.

PRACTICAL AND ORAL EXAMINATION

The candidate will be examined as to the mode of testing weights, measures, and weighing and measuring instruments, and as to his practical acquaintance with the weights, measures and instruments generally in use in trade. He will be expected to possess an intelligent knowledge of the various tests, particularly those prescribed in the Weights and Measures Regulations, 1907, and of the notices issued by the Board of Trade respecting patterns of apparatus submitted for examination under Section 6 of the Weights and Measures Act, 1904. He may also be required to adjust and stamp weights and measures. Tables of the allowances for error and sensitiveness prescribed by the Regulations will be available during the practical examination.

For the theoretical side of all these subjects, there are a number of commercially sponsored courses available to candidates. One of the most common is a course run by the National Association of Local Government Officials. These courses are usually supervised by inspectors who are specialists in the various subjects under their supervision.

Mechanical engineering courses are also available and are extremely helpful insofar that they usually embrace mathematics, engineering science, machine drawing, etc. Students who take these mechanical engineering courses usually qualify for their National Certificate in Engineering. This certificate, of course, is not a statutory obligation.

The pattern usually established is for the "would be" inspector to enter the service and immediately start some studies relative to his ultimate goal of securing a Board of Trade Certificate. Some author-

ities insist that his first two years are spent in the Weights and Measures office in a clerical capacity and during that time he has the opportunity of familiarizing himself with the administrative work to be done. He then works as an assistant to a qualified inspector. It will be interesting for you gentlemen to note at this stage that invariably an inspector of weights and measures in England is accompanied during his course of duties by an assistant. The assistant has many onerous duties to perform such as weight lifting, carrying and emptying measures of which you are all fully aware, and also he acts as a witness in corroboration to the inspector in any prosecutions which the inspector is engaged upon.

In dealing with the training for weights and measures practice, it has already been stated that the theory for this subject is well covered by various correspondence courses. However, on examining the syllabus, we see that this subject directly concerns those types of machines and instruments of which a very definite practical knowledge must be obtained. It has been the experience that many students are capable of assimilating theoretical knowledge, but the difficulty has always been in the student gaining sufficient practical knowledge prior to the examination. This has been and is today still a major problem, and it would appear that the course to adopt is for local authorities, through their weights and measures department, to set up some localized training for this most important angle in the student's training. The great majority of this training can be done in the local inspector's office where there are invariably available smaller types of weighing and measuring instruments. In addition to this, various scale manufacturers have always been willing to throw open their doors for the purpose of giving students training in the specialized theory and practice of manufacturing weighing instruments. As a matter of fact, one company runs a week's course at their factory prior to each examination. In this course lectures and demonstrations are given by members of the manufacturer's staff and the local inspectors of weights and measures give further assistance during this week's course.

You will notice further in this syllabus that a general knowledge of approved patterns as issued by the Board of Trade under Section 6 of the 1904 Act is necessary. This is something rather different from the conditions relative to approval that we know in the United States. It is obviously impossible for a student to gain enough knowledge of all of those approved patterns because now they run into the many, many hundreds, but it is possible for the student to have a good knowledge of an approved pattern in each group; for example, a certain type of automatic weighing machine or egg-grading machine.

Most of the necessary knowledge for weights and measures practice is gotten by the day-to-day work of the assistant with his inspector. A great part of his time is spent assisting in the verification and inspection of weighing and measuring instruments and, of course, weights and measures.

Reading, learning, and more reading and more learning is the answer to legal study. Generally, the student will confine himself to common law, statutory law, and case law pertaining to weights and measures administration. Here again the student's everyday duties bring him into close contact with the practical aspect of weights and

measures law. He should have a working knowledge of the laws of evidence and conduct and procedure in the lower courts for, in some cases when he is qualified and appointed as an inspector of weights and measures, he will be required to prosecute in a court of summary jurisdiction, on behalf of his local authority. As an inspector's corroborative witness in practically all of the inspector's cases, the student has ample opportunity of becoming more than acquainted with court procedure.

Now we come to the most difficult and, in many person's opinion, the most important aspect of the Board of Trade examination, and that is the practical and oral test. In the practical test we have the candidate now showing his manipulative skill and his ability to use precise apparatus to advantage, very necessary qualifications, as has already been stated in my quotation from Mr. Trump's address. For the trainee to become proficient at testing weights and measures and weighing and measuring instruments, he has the facility of a normally well-equipped weights and measures office. The other requirements of the oral and practical examination are really just an expression of the results of careful and diligent study regarding the legal requirements of those machines and instruments, together with weights and measures that come within the scope of the inspector's every-day work.

It will be realized now that by far the great majority of the study period and training is done on the student's own time. It will further be realized that a candidate who has satisfied the Board of Trade examiners in all these subjects is certainly a man who comes very near to satisfying the combination of accomplishments which were referred to in my opening remarks.

In conclusion, I would like to add that the Institute of Weights and Measures in Great Britain have taken it upon themselves, through their District Branches, to establish training programs in central areas for the assistants who are studying for the Board of Trade examinations. I would like to quote from a letter I have received recently from J. R. Roberts, D. P. A., Chief Inspector of Weights and Measures, City of Manchester, an ex-colleague of mine.

> As a direct result of my paper we have been able to get started in Manchester a recognized course in weights and measures administration under the auspices of the North-Western Branch and the Manchester Education Committee. We are fortunate in having a goodly number of weights and measures authorities in this area, and the class membership this session has been 27. The students meet twice a week, two hours on Monday evenings for Mechanics and Physics (including laboratory work) and two hours on Wednesdays for Weighing and Measuring Practice and Acts and Regulations. In addition, lectures and demonstrations by manufacturers of weighing and measuring devices have been held at this office and elsewhere. The class seems to have fulfilled a long-felt want and has been very well supported by the regular attendance of the students. I am now hoping to see some practical results by local successes in the Board of Trade and Institute's examinations. I understand that similar courses are being organized in other parts of the country.

The paper Mr. Roberts referred to was one he read at a North-Western Branch meeting entitled "Education and Training in the Weights and Measures Service." The Institute of Weights and Measures Administration has recently set up an examination of their own and I believe it is the hope of many that this examination will have

legal acceptance together with the Board of Trade examination at some future date.

You will realize, gentlemen, that I am in no position to make any recommendations to you nor am I so bold as to make any suggestions to your annual Conference, but I am sure that at this stage I am in a position to state what I know of the material available now for training inspectors of weights and measures in the United States. There are the Handbooks 26, 37, and 44, and the new Handbook 45, which basically contain information as to requirements and methods of testing, etc. There is that material which has been made available to you by the National Bureau of Standards. I am sure there is sufficient cooperation between the inspectorate and the manufacturers to allow educational visits to scale and other factories. With all this material and all these facilities available, the only other requirement necessary for sound training is a very definite training program to be accepted and put in force by State, City, and County authorities with the utmost control, management, and follow-up of training groups.

REPORT OF THE SPECIAL CONFERENCE COMMITTEE ON UNIFORM REGULATIONS, PRESENTED BY R. D. THOMPSON, CHAIRMAN

The activities of this Committee as such have been confined chiefly to a somewhat summary study of the various regulations in effect in jurisdictions throughout the country, in an effort to determine just what regulations might be considered as basic.

The dissimilarity of laws in force in the several States and likewise the authority to promulgate regulations make such a study extremely difficult.

Since the resolution passed by the Thirty-fourth Conference in 1949 did not authorize this Committee to offer model regulations, but rather "to gather and present to the Conference on Weights and Measures a *program of ideas* and *examples of regulations* that may be used by weights and measures officials," we find ourselves very much restricted in recommending any specific regulations.

We therefore wish to restrict this report to reaffirmation of certain principles pertaining to regulations and to recommendations as to the future of the Committee.

The regulations to be dealt with by this Committee should not be confused with those contained in Handbook 44 pertaining to commercial weighing and measuring devices, but rather should be confined to the field of sales of commodities and interpretation of other phases of law.

It should be noted that those States which have enacted the Model Law, and have kept it up to date by amendment, do not have the need for many of the regulations which have been adopted in other States in order to meet a weakness in their basic law.

The Committee again would like to point out some of the advantages and disadvantages of regulations. Regulations have the distinct advantage of being more flexible than laws; they also may be changed or repealed after due trial, if they prove to be impractical of enforcement, or if the need no longer exists for such regulation, without recourse to legislative channels. Further, regulations may be expressed in simpler and clearer language than is necessary in a law, and may be more detailed and specific, if this is desirable.

However, we should point out that, in many instances, the courts do not look with favor upon enforcement by regulation. An official stands a much better chance of obtaining a conviction on a warrant charging violation of a specific section of the law than he does on a regulation promulgated under the law.

We believe that if a regulation has the background of precedent, such as adoption by the National Conference, or enactment by other States, it will be looked upon with more favor by the courts.

We wish again to state some of the principles that we believe to be basic in drafting regulations:

First: The regulation should bear a number, and a clear brief descriptive title at the top of page 1, this to be followed by a statement of authority for its promulgation as:

Authority: Vol. 1, Chap. 6, Section 59–73, Code of Michigan 1950

In some States the practice of quoting the section in the law authorizing the regulation is followed, and this would seem to be a desirable practice.

Regulations should not be finally adopted without advice from your Attorney General or some one in a similar capacity. Pains should be taken to express a regulation in as clear and concise a manner as possible, and in many instances it may be desirable to enumerate the points to be covered, as 1, 2, 3, etc.

Second: An effort should be made to find if other States have issued regulations on the subject you wish to cover, and use these as a basis for drafting your regulation. It is important to find out if any other governmental agency has a regulation covering the subject, in order to avoid conflict.

The recommendations of the Committee on Methods of Sales of Commodities of the National Conference also should be given consideration; these, of course, are to be found in the National Conference reports.

As stated in our previous report, apparently most States having an adequate weights and measures law include a "Net Container Act", which requires that all packaged goods bear a declaration of net contents. This act, in all instances where the model law has been followed, carries a provision that "reasonable variations or tolerances shall be permitted and that these variations or tolerances and also exemptions as to small packages shall be established by rules and regulations".

Most States have promulgated regulations under this act, but there is very little uniformity. It would seem highly desirable that the National Conference adopt a model regulation on this subject and that such a regulation be written into the record. The adoption by the States of a uniform regulation under their Net Container Acts, which would parallel the regulation promulgated by the Federal Food and Drug Administration, would do much to eliminate the present confusion as to labeling requirements, exemptions of small packages, and commodity tolerances.

The Committee feels, since it was created as a temporary and not a standing Committee, that it should be discontinued and its field of activity assigned to the Legislative Committee with the authority to draft and offer for adoption such model regulations as may seem desirable and consistent with the Model Law.

As a further recommendation we suggest that the National Bureau of Standards give the Legislative Committee legal assistance, if possible, in making a comprehensive survey and analysis of existing regulations in the several States.

(The report of the Special Committee on Uniform Regulations was adopted by the Conference.)

LPG DISPENSING EQUIPMENT—RETAIL

By W. M. Harks, *Vice President, Bowser, Inc., Fort Wayne, Ind.*

As a manufacturer of liquid-measuring devices for both the retail and wholesale trade, I am grateful for the privilege of presenting to this group an outline of one of our major problems in our program of supplying equipment for accurately measuring Liquid Petroleum Gas, commonly referred to as L. P. Gas. A brief look at the commercial phases of this industry, whose product sales reached a total of $635,000,000 [1] in the year just closed, is very much in order as a prelude to this presentation.

The phenomenal growth of this 15-year-old L. P. Gas industry may be realized by noting that the consumption of L. P. Gas in 1926 totaled 30,000 barrels, and in the year just closed the total purchases were barely short of 231 million barrels, or 12 billion gallons (see footnote 1)—an increase of astounding proportions! Excluding that portion of L. P. Gas used commercially in large quantities for industrial ends, such as synthetic rubber, utilities, or gasoline treatment, we can focus our attention on that volume which found its way into consumer channels, and try to visualize its distribution structure, which should be the concern of this body in its fundamental purpose of fostering unswerving accuracy of measurement of all liquids sold to the public and of minimizing the perpetration of fraud through establishment of specifications and tolerances for dispensing devices.

At the end of 1950 we find 7½ million customers [2] for L. P. Gas. Their purchases were made from 4,000 bulk plants spread throughout the 48 States, although the greater percentage is concentrated in the Pacific and Southwestern sections of the country. However, we are now witnessing the beginning of a vast distribution system which will bring the advantages of L. P. Gas to other areas at low transportation cost and will, thus, add many more millions of consumers to the rapidly accelerating list of users. Pipe lines now under construction for propane will reach new markets within the next year, and successful experiments in storing L. P. Gas in underground salt beds and salt water sands will assure an adequate year round supply for regions several thousand miles from the original source of this new fuel.

Of great significance to us who labor in the field of dispensing motor fuels through retail and wholesale dispensing systems is the evidence of acceptance of L. P. Gas as a desirable fuel for internal combustion engines on the part of truck and bus manufacturers as well as fleet owners of those types of vehicles. Buses and trucks are now being factory engineered for L. P. Gas and conversion kits are readily available for older models. In the City of Milwaukee, for

[1] Tulsa (Okla.) Tribune (Jan. 16, 1951).
[2] L. P. Gas (Feb. 1951).

instance, we see the recent conversion of a large fleet of taxicabs to L. P. Gas as a more desirable fuel than gasoline. Within the past few months one of the country's largest bus systems placed an order for 500 new buses, factory-built for L. P. Gas operation in competition with diesel and gasoline-propelled types (see footnote 2).

As a further indication of the widespread invasion of L. P. Gas into the internal combustion engine field, the sale of L. P. Gas conversion kits for tractors in 1950 totaled 100,000, which is equal to 22% of all wheeled tractor shipments in the corresponding period (see footnote 2). Claims of increased engine life because of elimination of carbon deposits and washing down of lubricants, with a consequent longer bearing and cylinder life,[3] cannot be ignored as a potent factor in the phenomenal growth of conversions to L. P. Gas in the internal combustion engine field. One manufacturer of internal combustion engines makes a claim of as high as 50% in increased engine life [4] with the use of this fuel.

THE WEIGHTS AND MEASURES PROBLEM

As manufacturers of liquid-dispensing systems, we are mindful of our responsibility to provide a line of L. P. Gas dispensers which can be purchased and installed by the marketers of L. P. Gas with the same measure of confidence that is now enjoyed in the purchase and installation of a gasoline pump.

Unfortunately, the development of L. P. Gas dispensing systems has not kept pace with the expansion of the L. P. Gas industry. Today there are literally hundreds of crudely assembled systems in use in various sections of the country which would fall far short of meeting minimum requirements as retail or wholesale devices if ordinary tests were applied. If time permitted, it would be interesting to examine the photographic evidence of a representative number of these home-made devices which are now purporting to measure L. P. Gas in retail and wholesale transactions.

Our survey of the problem to be met by us as manufacturers indicates that there is an immediate need for two types of L. P. Gas dispenser which will directly concern weights and measures officials throughout the country during the coming year. These are

1. A dispenser of both the computing and noncomputing type having a capacity of 35 gallons of L. P. Gas per minute. This type will be used for dispensing to the cross-country truck trade, to fleet users of buses and other commercial vehicles with large-capacity fuel tanks where speed of refueling is essential.

2. A dispenser of the computing type having a capacity of 15 gallons per minute for dispensing L. P. Gas to a less restricted class of trade, such as the taxicab and small-truck trade, the retail filling of bottles for the trailer and domestic trade and general all-purpose retail use.

The mechanical features of these dispensers follow the general characteristics of a gasoline pump with such variations as are necessary for the differences in the liquids handled. The entire system, for instance, is designed to operate at a working pressure of 250 psi. Because of the complete absence of lubricating qualities in L. P. Gas,

[3] National Petroleum News (Feb. 28, 1951).
[4] L. Fageol, Mass transportation (April 1950).

the meters are equipped with carbon pistons and valves in place of the leather-packed pistons customarily used in gasoline pumps.

As a matter of interest, both types have now been fully developed and have recently undergone the tests prescribed by the Department of Weights and Measures for Los Angeles County, Calif. Before these units are offered for sale to the trade, they will also have undergone the rigid safety tests required by the Underwriters' Laboratories, Inc.

The usual procedure for a manufacturer of liquid-measuring devices in designing a new piece of equipment is to make a thorough study of the specifications and tolerances applying to such a device before attempting to lay it out on the drafting board. By working within the specifications and tolerances as adopted and amended from time to time by this Conference group, he is sailing on a charted sea, so to speak, and has a reasonable assurance that, if his device complies with those specifications and tolerances, he can ship his product into any weights-and-measures jurisdiction with a feeling of confidence that it will be approved if it conforms with those specifications and tolerances.

In the case of L. P. Gas dispensers, however, we are sorely lacking such guidance in the special problems that apply to L. P. Gas. The manufacturer is on a more or less uncharted sea and must get his bearings by such stars as appear in various parts of the firmament. In our particular case, we are grateful to the State of California for having adopted certain specifications and tolerances with special application to L. P. Gas.

In the absence of specifications and tolerances promulgated by the National Conference on Weights and Measures to cover the variations peculiar to the handling of L. P. Gas, we have used the California code as our bible in the hope and belief that the tolerances and prescribed methods of test outlined in that code will fit the pattern to be adopted in the future by other weights-and-measures jurisdictions. Our problem will have to be faced by other manufacturers who seek to supply this new industry, and it is my recommendation that the Conference take the necessary steps to give recognition to the special problems involved in this phase of liquid measuring as has been done so ably through the past years in the perfection of gasoline-dispensing devices. It is my sincere hope that, by the next annual meeting of this group, as much progress will have been made toward this end as will have been made by the L. P. Gas industry in the further expansion of its markets.

Mr. W. H. Sieger. Mr. Chairman, I have been asked on behalf of the Meter Manufacturers, Weights and Measures Committee, to offer our help and assistance in this matter that Mr. Harks has just discussed so ably. We shall be glad to give our help and assistance to your Specifications and Tolerances Committee on the problem of formulating these necessary specifications and tolerances.

We realize that this is a subject that will need a lot of careful study and thought. We offer our experience for your help, and also the experience and the work that the Combined Committee of the American Petroleum Institute and the American Society of Mechanical Engineers, known as the P. D.—Positive Displacement Meter Committee—has performed in this connection.

TEST PROCEDURES AND EQUIPMENT FOR LIQUID-MEASURING DEVICES

WHOLESALE—BY W. H. SIEGER, STAFF ASSISTANT MANAGER OF ENGINEERING NEPTUNE METER COMPANY, AND CHAIRMAN OF THE METER MANUFACTURERS WEIGHTS AND MEASURES COMMITTEE, NEW YORK, N. Y

When requested by your Conference Secretary to prepare a paper for presentation at this, your 36th National Conference on Weights and Measures on the subject "Equipment and Procedures for Testing Wholesale Meters," no particular treatment suggested itself. However, after giving it some thought, it became apparent that there is much more to this subject than is at first apparent. As we cannot hope to cover it in complete detail in a short paper, we can only touch upon its broader aspects. There are, however, excellent references for a detailed treatment of the subject. They include the Positive Displacement Meter Code prepared by a joint Committee of the API and the ASME, papers presented at past Conferences, and the new NBS Handbook 45, which is now available. In the new Handbook, this subject is covered in precise and detailed form especially for the weights and measures official. Its preparation reflects a considerable expenditure of time, effort, research, and ability of its author, Ralph W. Smith. To the newcomer who may not know Mr. Smith, it should suffice to say that his qualifications are obvious, based upon his devotion of a lifetime to weights and measures work, from which he has recently decided to retire, his past position as Chief of the Office of Weights and Measures of the National Bureau of Standards, your past Conference Secretary, and as a member of the Specifications and Tolerances Committee.

Although these comments are based upon a preview of just part of Handbook 45, its value to every weights and measures official is unquestionable. Acquire a copy, give it study, and apply its contents, and you will do your job and yourself a service which cannot help but make your work more interesting and productive.

An analysis of the essential items of equipment and the procedure for performing this work reveals some very interesting facts. The material equipment, although expensive and available in only limited amounts, is just part of the story. The "know how" required for its proper and successful operation is as essential as suitable equipment. The acquisition of "know how" requires, however, far more than an occasional expenditure of money for equipment or the periodic check of a prover tank. It necessitates training each official to be expert in this highly technical work. His interest in his work and his ability to make the most of that interest requires the official to willingly study and apply himself to the job at hand. *The most important item on the list of equipment and procedure is your own personal ability.* Detailed technical knowledge of prover-tank design is not necessarily a "must" when you acquire prover tanks. You can rely upon a reputable manufacturer of such equipment, especially if your contract stipulates conformance with the details of construction set forth in the ASME–API P. D. Meter Code. If at that time you also specify adequate prover capacity to equal at least a 1-minute run at full operating rate through the largest meter to be tested, you are pretty well set for field work. Although it is granted that these are broad assumptions, it must be admitted that the careful planning they require

is a more or less "one shot" affair that requires no continual care other than proper maintenance and periodic calibration thereafter.

The proper procedure for the utilization of this equipment is, however, quite another matter. A piece of equipment can be used by many people. It can be passed down the line to new personnel. The basic essentials that were incorporated in its design pass along with it to the next fellow. But this is not true of the operating knowledge required for its proper use in the field. No matter how well the prover may be designed and constructed, its misuse or careless operation defeats the basic intent of weights and measures work.

It seems appropriate, therefore, to emphasize the more important aspects of the meter proving procedure itself. At the time when the testing of either a tank truck or loading rack meter is to be undertaken, it is too late to be concerned about adequate proving equipment. To do the job properly, the preparatory work must have been well done. Then we have available a prover of adequate capacity, one that drains completely and uniformly, has a properly designed neck and calibrated scale, is sufficiently rigid to sustain its careful calibration, and otherwise conforms to the many details of good prover design.

Before testing commences, it is also essential that a careful inpection be made of the installation to determine whether it appears to be in satisfactory working condition and that the installation as a whole is conducive to satisfactory performance. It would, for example, be a waste of time and may result in improper calibration to test a fuel-oil meter on a tank truck if the air release vent were plugged or its vent line was kinked to obstruct free air flow, or if the compartment into which it vents were not itself equipped with suitable vents. Although this may be an illustration of an elementary point, the fact remains that, without an elementary knowledge of installation requirements, meter testing by itself does not necessarily result in correct meter calibration. It is well worth the time that it takes to observe the normal operation of the system in actual use before proceeding with the test work. By becoming familiar with the operation of the system and observing the manner in which it is normally used, the Official not only avoids the possibility of time-consuming errors, but gets, at first hand, a demonstration which may be helpful to him for conducting tests. For example, a meter may be claimed to be inconsistent. Actually, by a performance demonstration, the Official may determine that its so-called "inconsistency" is really nonconformance with questionable compartment calibrations. Don't give in to the tendency of making meter adjustments before making a careful analysis of the entire situation.

In addition to the required pretest considerations, there are a number of important points relating to test procedure that must receive proper attention. Wetting of the prover before running the first test, complete and uniform drainage of the prover contents, proper leveling of the prover, etc., are the more obvious ones. But in how many meter provings is adequate attention given to the possibility of error due to evaporation of the test liquid as it splashes into a warm test measure? In how many tests is correction made for the error due to a difference in temperature between the product as it passed through the meter and the temperature of the product in the prover tank? Handbook 44 recognizes the effect of temperature change under its "Elapsed-Time

Test" where a correction of approximately 0.6% per 10 deg F is suggested for motor fuels. But no emphasis is placed on the possible need for the application of such correction to normal test procedure. The effect of temperature change on meter proving has been treated too lightly for today's close meter tolerances. The acceptance tolerance on a new meter as prescribed in Handbook 44 is ½ cubic inch per gallon for the first 50 gallons and ¼ cubic inch per gallon above 50 gallons. This amounts to 37½ cubic inches or 0.16% for a 100-gallon draft. A 3 deg F change in temperature will expand or contract gasoline by that amount. Therefore, if the temperature of the gasoline in the prover tank changes by only 3 deg F from the temperature at which it was in the meter, the change in volume in the prover tank has used the entire tolerance and leaves none for the meter. Are temperature readings taken and are the necessary allowances commonly made? They are not. Is the magnitude of this test procedure error generally realized? It is not. Gentlemen, under Handbook 44 we are working to laboratory tolerances which can only be met by applying laboratory precision to test procedure. Whether this is difficult to do in the field or whether it is within the realm of practicability is, unfortunately, a question that does not enter into the application of allowable tolerance. The tolerances have been established and are in force. The proving procedure must, therefore, be in accord with them. Weights and measures has prescribed close tolerances, and it is its duty to perform its work in a correspondingly precise manner.

Many weights and measures jurisdictions are handicapped by lack of funds to acquire suitable equipment to properly carry on their work. This is unfortunate, but it is gradually being corrected. The weights and measures official's job is not an easy one. He is too often faced with the mandates of his office that require exacting work, but has insufficient equipment and help to carry it out. Fortunately, he need not stand alone. There are many weights and measures officials who have far more than just a passing knowledge of this work. They are willing and anxious to cooperate and assist each other, as demonstrated, for example, by these Conferences at which so much is accomplished. The oil industry and the meter manufacturers are also willing and anxious to cooperate. They, too, are striving for accurate measure. But in our anxiety for perfection we must not lose sight of the limitations imposed by the need for being practical and must guide ourselves accordingly.

By continuing our past cooperation, by recognizing the difficulties we face and finding practical answers, by the acquisition of adequate testing equipment and learning the required "know how" to perform this technical work, we can continue to make the fine showing of progress of which we can be rightfully proud today. We are in this together, so let us continue to act as a team and give it all we have.

RETAIL—BY NELSON FRIZ, ESSO STANDARD OIL COMPANY, AND MEMBER JOINT ASME-API PETROLEUM P. D. METER COMMITTEE, NEW YORK, N. Y.

Ten billion dollars worth is the estimated amount of gasoline which our automobile owners will buy in 1951. You are charged with the duty of making sure that our motoring public receives full value for its money, or, rather, that it obtains the amount which it

pays for. In carrying out your functions, you must necessarily follow certain procedures and use certain equipment, and it is with these that this paper deals.

It is important that you, among yourselves, overcome the lack of standardization in requirements and in test practice in various State Weights and Measures groups. It is likewise important that you set up an over-all common sense standardization, within the limits of reasonable practice, this particularly in view of the shortages in manpower and materials which seem certain to prevail for some time to come. From your own standpoint, you should recognize—and among others stress the fact—that proper and adequate test equipment is absolutely essential.

It is not possible, within our time limits, to even briefly discuss the testing of all varieties of pumps, such as the piston and visible types, with their various ramifications. An excellent description of these devices, with the proper testing procedures and equipment, is to be found in chapter 14 "Liquid Measuring Devices", of the new Handbook on "Testing of Measuring Equipment", which the National Bureau of Standards will soon make available. I commend this to you and to all persons interested in measuring petroleum products, for careful study and the application of its recommended practices. It also treats fully of the testing of modern retail meter-type devices, which will undoubtedly be your major problem, and with which this paper is concerned.

Those of you who have visited the factory of a reputable pump manufacturer will know of his production-line tests—and that it will be a rather rare occasion when a pump, leaving the plant, is not accurate within acceptance limits which you and Handbook 44 have set up. You will also know that, with a modern pump, there is not a great deal which an unscrupulous operator can do to cheat the customer without risking easy detection. Nevertheless, you must be on your guard, making certain that all elements of the pump are in place and that they are functioning as the manufacturer intended. You should also watch for "home-made" additions, which, while perhaps installed with the best of intentions, may not work out quite to the customers' benefit. It is obvious that any diversion of the metered liquid back to the operator's supply tank is intentionally fraudulent and not in this category.

For testing these modern pumps, you will need only a metal 5-gallon "field standard" with a graduated neck, a sharp eye, and your good common sense. Your complete equipment for testing at service stations might be metal liquid containers of 1-quart capacity, conical or cylindrical and graduated neck metal "field standards" for 1, 2, 3, 4, and 5 gallons. Also recommended is a cylindrical glass graduate of several cubic inches capacity, with ¼-cubic-inch subdivisions. It seems hardly necessary to say to you that these standards should be carefully kept in good condition and rechecked at intervals.

Many of you may have heard the very complete paper given last year by Mr. Heaslip of Detroit on the duties of an inspector in a service station. Substantially in agreement with him and wholly in agreement with the National Bureau of Standards' forthcoming Handbook, the following might be set up as an outline of the procedure to follow in testing modern gasoline pumps.

I. PHYSICAL INSPECTION

Are adjustable elements affecting metering properly sealed?

Does the pump—and its installation—conform to Handbook 44? In particular, is the pump set level and securely fastened to its foundation?

Is the pump system properly filled, as evidenced by the visigage or sight glass? If not, leakage has occurred or some liquid has been drawn from the hose or a drop in temperature has caused normal contraction of the gasoline. An elapsed-time test may be in order.

Is the hose full? Handbook 44 and many States require a check valve in the nozzle and I believe that, in any case, the majority of nozzles are so equipped. Before starting the pump motor, open the nozzle discharge valve and shake the nozzle to determine the presence and proper functioning of the check valve. A "dry" hose will cause the meter register to "jump", as soon as the pump motor is started and before normal delivery begins.

Is the air eliminator air vent line plugged or constricted, so that air passes through the meter and short changes the customer? If so, immediate correction should be ordered. We would otherwise expect little trouble with these air eliminators, at least so far as your work is concerned. Nevertheless, at intervals throughout your test you should watch the visigage for air bubbles, which would indicate that the air eliminator is not functioning properly, or that excessive air is being induced through a "cracked" connection.

Is the zero-set-back interlock mechanism in place and apparently in good working order? This should be noted several times during your tests, clearing the indicating elements to zero to check on the accuracy of the set-back and for proper interlock.

Is the proper unit price per gallon indicated on computing pumps? Here again, we would expect little difficulty with the money value indications getting out of phase with the gallonage indications. You should, however, check the accuracy of the money value computations at several different gallonages.

Is the pressure relief valve in place and apparently in good order to maintain normal operating pressure on the discharge side of the meter and to prevent excessive pressure and excessive vapor formation, which will cause short measure to the next customer?

Finally, does the pump appear to have all its normal parts, without changes or additions and without diversion of the metered gasoline? Is its dial and sight glass clean? Does it appear to be properly maintained, in good condition, and free of air or liquid leaks?

II. TESTING

Always read the bottom of the meniscus on the gage glass in the graduated neck of the 5-gallon standard. The standard must be set level, or suspended so that it hangs plumb.

Always work to set and recommend standard procedures. Thoroughly wet the interior of the standard before each test run, empty the standard, and allow it to drain for 10 seconds. Proceed with the test run at once.

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Always make readings promptly after a test run, to avoid errors due to evaporation or from a change in volume due to liquid temperature change.

Always operate the pump during a test run until an exact meter indication of an even gallon is given. Read any error in delivery on the graduated neck of the standard.

For "normal" tests, made at the maximum discharge rate, endeavor to maintain full flow with the nozzle valve wide open for as much of the delivery as is possible, tapering off at the end only enough to stop on an exact even gallon and perhaps to avoid overflowing the standard. "Special" slow flow tests should be fairly accurately timed, maintaining the delivery of 5 gallons per minute (or at any *lower* speed which may be given on the dial as the low limit of accuracy).

Duplicate or check test runs should be standard procedure, except on the 10 gallon draw, as noted.

III. TEST RUNS

(With the standard thoroughly wetted and drained for 10 seconds immediately before each run)

No. 1: Five nominal gallons at "normal" or maximum rate.

Read the error of delivery directly from the graduated neck of the standard. If the device is a computer, check the accuracy of the computed price. Clear the indications to zero and check the accuracy of the zero indications for both gallons and money value.

No. 2: Repeat No. 1 as a check.

No. 3: Five nominal gallons at "special" slow flow rate of 5 gallons per minute (1 gallon per 12 seconds).

Read the error of delivery directly from the graduated neck of the standard. Clear the indications to zero and check the accuracy of the zero indications for both gallons and money value.

No. 4: Repeat No. 3 as a check.

In addition, if the device is a computer, interrupt the discharge at 3 even-registered gallons. Note the computed price and later check the accuracy of the computation.

No. 5: (Only if the value of error in any of the preceding four test runs closely approaches the value of the prescribed tolerance.)

Draw 10 nominal gallons at either the "normal" or "special" slow flow rates, according to which showed the error approaching the allowable tolerance.

Deliver into the standard approximately 5 gallons, but do not stop the pump motor. Record the reading from the graduated neck of the standard. Dump and drain the standard for 10 seconds. Continue the discharge into the standard until the meter indicates exactly 10 gallons. Record the second reading from the graduated neck of the standard and combine this algebraically with the error recorded for the first portion of the delivery. This will give the error for the total 10-gallon delivery.

Clear the indications to zero, checking the accuracy of the zero indication for both gallons and money value.

No. 6: Repeat No. 5, if the error in No. 5 exceeds the allowable tolerances.

These 10-gallon tests provide proportionally less allowable tolerance than the 5-gallon draws. Should the errors in the 10-gallon tests be in excess of the applicable 10-gallon tolerance, rejection of the pump is in order.

ELAPSED-TIME TEST

You may or may not need to consider this. If the pump is "full," with no indication of leaks, or of air in the visigage, and if the first test run shows it to be within tolerance, the elapsed time test should not be required. If, however, there are signs of trouble by air, leaks in the hose nozzle check valve, needle valve, pressure relief valve or elsewhere, and if the first test run is short and the second within tolerance, a time test should be made, as follows:

Draw 5 gallons as in test run No. 1 and note the reading on the standard. Require the pump to be locked and kept out of service for a number of hours, one, two, or more, when again 5 gallons should be drawn as in test run No. 1, and the reading on the standard noted. The difference in these two readings is the error in the time test. The allowable tolerance is 2 cubic inches per hour.

Due allowance for a temperature change should be made, on the basis of 0.6 percent per 10 deg F change.

If the pump is approved after the required tests, affix lead-and-wire security seals to protect all adjustable elements affecting measurement.

The preceding is, of course, "very old stuff" to most of you, and some may not entirely agree with all steps in the tests, particularly as to repeating the draws in all cases. Others may wish to precede test run No. 1 by perhaps a smaller draw, especially if the pump has been standing idle for some time. I believe, however, that the procedure as outlined is sensible and sound and that it will tell you without any doubt or question all that you need to know about a pump in order to approve or condemn it.

THE NEW MARYLAND WEIGHTS AND MEASURES LAW

By Dr. H. L. Stier, *Chief, Department of Markets, State of Maryland*

On May 7, 1951, Maryland obtained a new Weights and Measures Law. On this date, the Governor signed this new legislation after many years of inadequate legislation and futile attempts in many sessions of the Legislature to give Maryland a new and up-to-date Weights and Measures Law. The special commissions appointed by the former Governors of the State of Maryland to study the weights and measures situation in the State invariably recommended the redrafting and revising of both the law and the weights and measures organization setup in the State. However, the legislative history of all the bills introduced shows that none of the bills ever got out of the committee to which they were referred upon introduction, this despite the fact that many leaders in industry and agriculture recognized the need for improving Maryland weights and measures administration and recommended such action.

On June 28, 1950, weights and measures personnel in the various counties and the City of Baltimore and the State Department of Markets met together in the Office of George H. Leithauser, Senior Assistant Superintendent of Weights and Measures in Baltimore City, and formed the nucleus of the Maryland Weights and Measures Association. In addition to those that were directly concerned with weights and measures activities, there were also present at this meeting a representative of the Office of Legislative Reference, a member of the State Senate, representatives of County Commissioners in counties having no weights and measures personnel and the legal counsel for one of the County Board of Commissioners. It was at this meeting that A. Morton Thomas, Director, Department of Inspection and Licenses of Montgomery County, was elected Chairman of the group and instructed to give major attention during the year to the matters of legislation and education in the weights and measures field. May of 1950 marked the beginning of the many frequent and long sessions that were to be subsequently held in shaping a new Weights and Measures Law for the State of Maryland. Model Law No. 2 prepared by the National Conference on Weights and Measures several years ago was used as a starting point for Maryland's new legislation. A Legislative Committee consisting of Mr. Thomas, Mr. Leithauser, Dr. Howard L. Stier, and William S. Bussey, Chief, Office of Weights and Measures, National Bureau of Standards, Washington, D. C., ex officio, prepared the first draft of the law. After conferences with the State Board of Agriculture, representatives of various industries and others, this draft was amended from time to time. By the end of 1950, it was felt that we had a law which met most of the requirements of the needed legislation, and, at the same time, had a good chance of passage. The Legislative Committee worked closely during its activities with Dr. Carl Everstine in the Office of the Maryland Department of Legislative Reference. His helpful and cooperative assistance aided the group greatly in preparing a law which met the legal requirements of the State and of a form acceptable to the Legislature. Conferences were held with groups in industry and with agricultural organizations soliciting their suggestions and support for the new legislation. On January 10, 1951, at the Annual Meeting of the Maryland Agricultural Society and the Maryland Farm Bureau Federation the following resolution was unanimously adopted:

> Accurate weights and measures are important to fairness in the conduct of the affairs of the Agriculture of the State, which has an annual value of approximately $250 million to the farmers,
>
> The benefits of accurate weights and measures apply to all citizens and such benefits are self-evident and undisputed, and
>
> Adequate weights and measures service is not available to the citizens of the State of Maryland, except in Baltimore City,
>
> Such services are essential to the conduct of interstate commerce and most other States now have uniform weights and measures legislation and enforcement.
>
> We urge the Maryland General Assembly in session during 1951 to enact a revised weights and measures law for the State of Maryland (Not affecting existing operations in weights and measures enforcement in Baltimore City) which would provide a State Weights and Measures Agency operating under the State Board of Agriculture with sufficient authority to provide the citizens of the State with the weights and measures protection they rightfully expect.

This organization represented all segments of Maryland agriculture. The Secretary of the organization forwarded a copy of the resolution to the State Legislature and wrote a personal letter to the Chairman of the Senate Finance Committee, to which the new bill had been referred.

Mr. Thomas spent much time and effort from January through March in getting the bill introduced and following it through all its legislative history from the time of introduction to the day it was signed by Governor McKeldin. The first step in the introduction of the bill was to obtain sponsors. Messrs. Thomas and Stier of the Legislative Committee visited the Montgomery County Delegation in their office in the State House and discussed at some detail the background and history of the previous legislation and the new bill. The delegation, as a whole, was very favorable in its reaction to the new bill. Senator Hyde, of Montgomery County, was so favorably impressed that he immediately requested the opportunity to sponsor the bill in the Senate. Senator Preston, of Baltimore City, joined with him in sponsoring the bill. It was introduced to the State Senate on February 9, 1951, and referred to the Senate Finance Committee. The Legislative Committee of the Maryland Weights and Measures Association immediately contacted Senator Goldstein, who was Chairman of the Senate Finance Committee, and made known to him and his Committee that the Maryland Weights and Measures Association would help and assist the Committee in any way possible. The Senate Finance Committee scheduled a hearing on March 7. The Association had present for presentation of testimony at that hearing the following persons: Mr. Thomas, Mr. Leithauser, Dr. Stier, Mrs. Margaret Kimball, Deputy Director of the Bureau of Labor and Industry, Robert Mathias, Legal Counsel, Prince Georges County Commissioners, and W. F. Mulligan, President, Prince Georges County Civic Federation. The hearing had attracted considerable interest and the hearing room was packed. Many of those present represented some form of opposition to the bill by commercial firms. Subsequent events revealed that the only real opposition originated in the bread and soap industries. At this hearing, the representatives of soap industry exhibited tremendous opposition, but it has been learned since that time that this was entirely the feeling of the legal representative at that hearing and not the general feeling of the industry. The dairy industry was also represented and had only one minor objection, and that was the inclusion of a ⅓-quart measure, anticipating the use of this size container for concentrated milk. Since the majority of the dairy industry representatives were against this unit of measure, this provision was deleted. One minor change concerned the designation of weight on containers containing cottage cheese. After a somewhat stormy hearing and cool reception of the bill by the Committee, we were not certain what the future of the bill might be. We believe that probably one of the most important bits of testimony offered was that given by Mr. Mulligan representing the consumer interests. This witness presented a very impressive and significant summary of the feelings and actions of the civic groups in his county. His testimony was all the more valuable, since it came immediately after a challenge by a member of the Finance Committee to show one consumer who would speak in favor of the bill.

After the hearing before the Senate Finance Committee, the bill was referred to a subcommittee, headed by Senator Kimble of Allegany County. The other members of the subcommittee were Senator Byrd of Worcester County and Senator Shehan of Talbot County. This subcommittee met on March 13 (approximately a week later) with the Legislative Committee of the Maryland Weights and Measures Association to revise and redraft the bill. The redraft of the bill was reported out with a favorable report from the Senate Finance Committee. It later passed the Senate and was referred to the House Ways and Means Committee. All this time, Mr. Thomas continually followed the progress of the bill and appeared before the House Ways and Means Committee to testify again concerning the bill. Additional modifications and amendments pertaining to bread and twine or cordage were made by this Committee. With a favorable report from this Committee, it went to the Floor of the House. It passed the House and went back to the Senate for reconsideration of the amendments made in the House. By this time, the end of the session was nearing. If it had not been for Mr. Thomas' continual efforts at the State House, the bill would never have come to a vote again in the Senate. It finally came to a vote at the very last session of the Legislature for the year, and was passed at midnight on April 2, 1951. After further additional delay by the Governor in signing the bill, it was placed on the Governor's desk during the last week in which the Governor could sign the bill. The delay in the signing of the bill was due to additional opposition to the bill being raised by a prominent ice cream manufacturer of Baltimore City. It appeared that this objection might have the effect of causing the Governor to veto the bill, and resulted in a number of telephone conversations followed by meetings with the ice cream manufacturer concerned, the Attorney General of the State, and others in the industry. Finally, on May 4, two days prior to the last possible date when the Governor could sign the bill, complete agreement had not been reached between the ice cream manufacturer and weights and measures officials on his basis for opposition. Further telephone conversations ensued with legislative assistants to the Governor. On May 7, when the Governor signed the last bills for the year, Mr. Thomas was in his office, and the Governor indicated he felt the bill was a good one and signed the bill at 11:30 a. m. on May 7 and the long struggle for the weights and measures bill was over, and it became law. The Association has received a letter from the Governor formally notifying it of his action.

You have heard me make several references to Mr. Thomas. You heard Dr. Condon, this morning, publicly commend him. Some of you were not present when that was done. I would refer all of you to Mr. Thomas to answer any questions concerning pitfalls and tips on how to do things in the Legislature. So that you might all see who this man is, I will ask him to stand. He is the President of our new Weights and Measures Association in Maryland.

Mr. A. Morton Thomas. I would like to make one comment. Dr. Stier presented the paper and, of course, had to be modest. But certainly without the assistance and cooperation and the drive of Dr. Stier, this bill would not be a reality. So I think we should give Dr. Stier a hand. We are not trying to put gravy on everybody's shoul-

ders, but he certainly deserves a commendation for the work that he has done. I would like to pass this on—it may be a little premature, but under the new law of the State of Maryland, we are supposed to have a State Superintendent. The Maryland Weights and Measures Association has already gone on record and made a formal recommendation that he be considered. We have recommended him for our new State Superintendent. We hope to hear before the first of June that his appointment has been made.

(Dr. Howard L. Stier was subsequently appointed State Superintendent of Weights and Measures for Maryland, effective June 1, 1951.)

ICE CREAM—SALE BY WEIGHT

By W. A. Kerlin, *County Sealer of Weights and Measures, Alameda County, Calif.*

I realize that the sale of ice cream by weight is a very controversial subject.

We, in California, have been accused for many years by people from other States of peddling hot air. We do not peddle hot air—hot air is free. We are all guilty, however, of peddling cold air—cold air delivered by manufacturers and offered for sale by retailers in the 48 States in pints, quarts, and gallons. The cold air to which I refer is the air that is whipped into ice cream during the manufacturing process. It is a well-established fact that 5 gallons of ice cream mix might become 10 or 11 gallons of finished product merely by the addition of air beaten in during the freezing process. "Over-run", as this is known to the industry, varies with each manufacturer, some being satisfied with 85%, while others are more greedy and take as high as 110 to 120%.

Our greatest problem, however, is not in the machine-filled quarts and pints, but in the so-called "hand-packed" units. If it is poorly packed, and it usually is, more and more air spaces get in. Holes do not count when buying doughnuts or pretzels by the pound, but they certainly do when they are sold in pints and quarts when buying ice cream by volume.

For some time now, industry has been aware that there is a definite movement to sell ice cream by weight. This subject has been under discussion since 1925, when Joseph G. Rogers, State Superintendent, Division of Weights and Measures, State of New Jersey, delivered before the Eighteenth Annual Conference a paper entitled "Shall Ice Cream be Sold by Weight?" Mr. Rogers, among others, has been very active in this field for the past 25 years.

Joseph F. Blickley, Director, Bureau of Standard Weights and Measures of the Commonwealth of Pennsylvania, informed me that recently a member of the General Assembly of that State presented a bill requiring the sale of ice cream on a weight basis because of the many requests received by the legislator from his constitutents who consider the sale of ice cream on a liquid measure basis both unethical and unfair, as there is no way of determining if one has received full value for price paid. I am sure all officials who have been actively interested in this subject will agree with that premise.

For the past 3 years, Salt Lake City, through its Sealer, E. C. Westwood, has promoted, whenever possible, the sale of ice cream by weight.

Many of the dealers are advertising the sale of ice cream by weight, and Mr. Westwood's department, through newspaper articles, has encouraged the public to request their purchases on this basis.

Since this policy has been in force, their complaints have been reduced by at least 50% and many of the dealers are now encouraging the Weights and Measures Department in Salt Lake City to submit to the City Commission a request to amend the law to the effect that ice cream shall be sold on a weight basis only.

During 1946 the Director of the Bureau of Weights, Measures, and Markets of the District of Columbia, J. T. Kennedy, conducted an extensive survey on the subject in question. After considerable time and effort was expended, and the usual adverse conclusions drawn concerning the sale of ice cream by liquid measure, public support did not warrant taking the matter further. This seems to be the case almost unanimously.

I wish to acknowledge the information given to me by the four gentlemen previously mentioned and to express my appreciation for the historical background which it provided.

One of the most recent attempts at this type of legislation was in our own State of California in 1949. The California Association of Weights and Measures Officials, through its Legislative Committee, drafted a bill requiring that ice cream be sold on a weight basis. This bill was introduced by Senator Arthur H. Breed, Jr., of Alameda County, and was referred to as Senate Bill 9, which read as follows:

An act to add Section 12024.6 to the Business and Professions Code, relating to the sale of ice cream.

The people of the State of California do enact as follows:

Section 1. Section 12024.6 is added to the Business and Professions Code to read:

12024.6. It shall be unlawful for any person to sell or advertise for sale any ice cream, sherbet or ice milk other than by weight determined at time of sale on a scale or beam properly sealed in accordance with the provisions of this division. The provisions of this section do not apply to the sale of ice cream, sherbet or ice milk sold in the wrapper or container in which it was received by the purchaser from, and on which appears the net weight of the commodity therein as marked by, the manufacturer, packer, wholesaler or jobber.

The provisions of this section do not apply to the sale of ice cream in cones or individual servings of the product mentioned.

The above was only 13 lines long, but it embodied all of the requirements we felt necessary. I was privileged to present the case for our Association, and Senator Breed, who is an ardent believer on this subject, presented his case, in a 2-hour hearing before the Senate Agriculture Committee, at which time arguments were heard for and against the bill. While some of the industry's statements were patently incorrect, they were, nevertheless, confusing enough to defeat the "do-pass" motion by a seven to six vote.

Being connected with legislative work during the past 3 years, first as President of our Association, and later as Chairman of the Legislative Committee, I have come to the conclusion that, until we can have the wholehearted support of consumer groups, we, or any official organization, are wasting our time to oppose seasoned lobbyists and politicians when presenting our cases before State legislative bodies. Our Association has not abandoned its support of this issue, but is

awaiting developments of the "educational program" which industry says they are instituting.

It is my opinion that this subject should be kept alive through the combined efforts of this and other organizations, and that the Committee on Methods of Sale of Commodities should again open the subject for hearing, discussion, and recommendation.

The weights and measures officials are not out to penalize any industry. However, packaging and merchandising has changed many times for many industries during these past decades. It is not the intent or purpose of weights and measures officials to jeopardize sales or increase prohibitively the cost of production or retail sales prices. On the contrary, we are desirous to cooperate with industry so that the producers will please the consumers to the ultimate satisfaction of both.

(The Conference adjourned, to meet at 10 a. m. Wednesday, May 23, 1951.)

THIRD SESSION—MORNING OF WEDNESDAY, MAY 23, 1951

(Dr. E. U. Condon, President, and F. C. Yarbrough, Vice President, presiding)

REPORT OF SPECIAL COMMITTEE ON THE TESTING OF RAILWAY TRACK SCALES, PRESENTED BY J. P. McBRIDE, CHAIRMAN

The Thirty-fifth National Conference on Weights and Measures adopted the following resolution:

> *Resolved,* That a committee of three members of this Conference be appointed to study and report at the next Conference on the practicability of State supervision over railway track scales and their use, this committee to consult with accredited representatives of the railway industry, to ascertain the practical requirements.

The members of the committee appointed under this resolution are James E. Brenton, California; Erling Hansen, Minnesota; and John P. McBride, Massachusetts.

During the aforementioned Conference, Dr. Condon, Director of the National Bureau of Standards, in his opening address, among other things, outlined the Bureau plans in relation to railway track scales. In his remarks, he stated that the railway track scale testing program is presenting some difficulty to the Bureau and that their equipment for that purpose has been two specially built cars, one of which had so far deteriorated that its further use was doubtful. The question that confronted the Bureau was to ascertain the proper course to pursue, with the idea in mind that railway track scales are legally in the category of devices within State jurisdiction, and, while the Bureau wanted to be of whatever help possible, it did not want to be in the position of usurping State prerogatives. Briefly, his remarks on this subject were as follows:

> We find that a fairly satisfactory service for the whole country has been operated in the past with only two test cars. I think it would be conceded it would be foolish then for the 48 States to engage in such matters. But it is so closely tied up with the responsibilities of the State officers that I would like the matter to get some attention from you in the planning of it, so as to make sure that we are doing what you want us to do, and not doing what you don't want us to do, and in general so that the whole matter is handled in a properly coordinated way as between the Federal interest in the matter and the State and local interests in the matter.

In accordance with the Conference resolution, your Committee undertook its work by corresponding with all State authorities having weights and measures functions, 44 in number, and with accredited railroad representatives. Replies were received from 32 States and, in all instances save one, it was the opinion of these various officials that the work should be performed by the National Bureau of Standards, as has been the long-standing practice. The railroad interests

contacted were of the same opinion. In the communication received by your Committee, there was a general feeling of satisfaction with the procedure already established with the desire that it be expanded if possible, albeit, in some instances a feeling of States rights was expressed.

While it is doubtless true that primarily this is a function of State government in its proper policing of weights and measures laws, it is also a fact that this activity would not, in each State, be a full-time operation. In order for the individual States to assume this task, a considerable expenditure of public monies would be necessary for the equipment, which would mean a test car, a master scale, trained personnel and necessary transportation facilities. This would result in a multiplicity of similar units in all of the States for infrequent use, and obviously, from the standpoint of economic operation of a governmental function, would not be good practice. From this standpoint alone, the problem suggests itself as one which is ideal for a centralized operation in the Federal Government and this without the taint of Federal intrusion but rather of Federal cooperation.

Another factor in this matter is that railway scales are confined to two types of use, namely, by railroads in determining transportation costs, and by large industries in shipment and receipt of carload lots of material, with the latter use being the predominant one. These transactions, therefore, would in most cases involve interstate commerce.

In examining the entire question, it appears that adequacy and accuracy of railway track scales became a matter of concern about the turn of the century and it moved from the industry itself seeking to accomplish more satisfactory results in weighing operations of this magnitude. As a part of the then projected program, the National Bureau of Standards functioned as an investigatory authority and was equipped with two test cars designed especially for testing master scales used for standardizing railway track scale test cars. The Bureau also had a third unit used principally in so-called spot tests.

From this beginning, the Bureau has furnished the calibrating equipment and personnel, and the railroads the transportation. It was the Bureau policy to notify all State authorities, in advance of time of operation of the unit within their jurisdiction, so that a State official might be present at the time of test and, from such observations, be in a position to apply the necessary seal, and copies of the test reports were sent to the concerned State authority. Thus, the Bureau served industry and acted in behalf of the State authorities in the fact-finding necessary to determine the course of action by such officials.

The railroads likewise have furnished equipment and personnel for testing commercial-type scales. In fact, the great bulk of this type of testing has been done by the railroads, who test not only their own commercial-type scales, but also those owned by industry. It is proper to state that the carriers have done a remarkable piece of work in

this field. However, it is the opinion of your Committee that additional master track scales should be installed. We suggest as particular locations for these master scales the New England area, probably Boston or Springfield, and the States of New York, Alabama, and Texas, which are areas not now so served.

It is the well-considered opinion of your Committee that this type of work is a special and concentrated function and that the industry involved can and does take care of the situation in an admirable manner. It is, however, essential that the government have a position in this activity by testing a representative number of commercial-type scales and by furnishing official means of calibrating master track scales and standardizing track scale test cars not having access to master track scales.

Moreover, we believe that the Bureau activity should be further expanded, in fairness to the importance of the problem involved, by maintaining at least two track scale testing units in constant service. This program, your Committee feels, would make possible testing of master scales with desired frequency, as well as accomplishing the testing of a more representative number of commercial-type railway scales selected so as to serve as a reflective index of the entire picture.

It is, therefore, the recommendation of your Committee that this Conference go on record as requesting the National Bureau of Standards to adopt as a permanent policy the procedure of furnishing testing equipment and personnel necessary for the proper conduct of the program; that the Bureau notify the proper State authorities when the equipment is to operate in their respective jurisdictions and furnish copies of test reports to such State authorities.

We further recommend that the States cooperate fully in this program by representation at such tests and by performing the necessary duties in relation thereto. It is also urged that the railroads continue their present practice of furnishing transportation for the Bureau equipment as industry's part of the program. We feel that this is a proper and sensible method of Federal aid to the States in this field of public service.

(Following presentation of the Committee report, J. N. Todd, Superintendent of Scales and Work Equipment, Southern Railway System, and Chairman, Subcommittee on Scales, Yards, and Terminals Committee of the American Railway Engineering Association, made the following statement.)

I am with the Southern Railway, and as chairman of the scale subcommittee of the engineering division of the AAR, I represent the railway industry. I feel that there is nothing to criticize. I believe that we can approve this report in general, but I would like to stress one or two points.

One is, of course, that it is very well written and a very well presented report. Another is the contribution that the railroads make. All of the work being done that has been done in nearly 40 years is under an existing agreement with the Association of American Railroads, by which the railroads furnish free transportation for this equipment throughout the country, and they are glad to do it, of course, because they benefit by it.

It is an existing activity and we feel it shouldn't be disturbed. I certainly hope that the Conference will give favorable action to this recommendation of the Committee. With respect to additional master track scales, it is true they are needed, particularly in the New England area and in the Southwest. Sixteen of the 19 track scales are owned by railroads. There is no provision in this recommendation for financing. I assume that will be taken care of in some measure, and I hope it will be. It is of mutual interest to the shippers as well as the railroads to have accurate weights, and this practice of calibrating master track scales, and through them sealing test cars, annually is a contribution to accurate weights that should not be disturbed, and we would like to see it continued as it is.

THE CHAIRMAN. I might say that the thing that brought this matter forcibly to my attention was the fact that one of our two equipments was in such a bad state of repair that we would have to make a major investment to replace it. Always when something of that sort comes up, it seems as though it is desirable to have a fresh look at the old situation and see if it does really correspond to present needs and whether there are matters of detail that could be improved.

It was that particular thing that led me to raise the question, not with any doubts or misgivings or anything about it. It is very gratifying to me to get the impression that the feeling at least of the Committee and perhaps of the Conference that the work as a whole is satisfactory.

What we want to do, of course, is to get down to the job of seeing how to improve it in detail, if it is on the whole satisfactory, because I am sure that nothing is so satisfactory but that it can't be improved in detail. That is all that I had in mind.

(There being no further comments, the question was taken, and the Committee report was adopted.)

PRESENTATION OF SCROLL TO NATIONAL BUREAU OF STANDARDS

Mr. J. E. Brenton presented to Dr. Condon, Director of the National Bureau of Standards, the scroll which was authorized by the Conference during the Second Session, and spoke as follows:

Dr. Condon, in the Government of the United States, consisting principally of three branches—Executive, Judicial, and Legislative—there are many agencies and bureaus, but we believe there are none that hold the esteem and admiration of the American people as does the National Bureau of Standards, of which you are the Director.

This scroll is presented on behalf of the delegates and members of the Thirty-sixth National Conference on Weights and Measures.

It is offered not only by the people here, but by the weights and measures officials throughout the United States. It is offered with the hope that you will remain for many years as Director of the Bureau, and that the Bureau will have many fifty-year anniversaries.

THE CHAIRMAN. These very kind and friendly words are deeply appreciated by all the members of the staff, I am sure.

We hope that we do in some measure deserve them and that we will in increasing measure continue to deserve them. I give you my word that we will do our best. This wonderful thing is signed by the six Vice Presidents of the Conference.

The National Conference on Weights and Measures

extends Greetings to the

National Bureau of Standards

upon the occasion of the 50th anniversary of its establishment

and Congratulates the

National Bureau of Standards

upon its leadership and accomplishments in science and technology, its encouragement and assistance in promoting standardization of measurements and instruments, and, in particular, its achievements in the science of metrology, which have contributed to the public welfare by increasing the accuracy, dependability, and uniformity of weighing and measuring throughout the Nation.

This scroll is presented by action of the 36th meeting of the National Conference on Weights and Measures, May 22-25, 1951.

Clement T. Baker, Vice President — H. B. Howard, Vice President

James C. V. Burton, Vice President — [illegible], Vice President

U. D. Campbell, Vice President — F. C. Yarbrough, Vice President

STANDARDS OF MASS

By L. B. Macurdy, *Chief, Mass Section, National Bureau of Standards*

The National Bureau of Standards is the custodian of the standard of mass for the United States. This standard is known as the Prototype Kilogram No. 20. Kilogram No. 20, like the national prototype kilograms of other countries, is an accurate copy of the International Kilogram and is the basis for the value of all weighings made in science, commerce, and industry in this country. It is necessary to

promulgate specifications for the weights used in these weighings in order to insure uniformity and reliability. In this talk I will discuss some of the principles involved in establishing these specifications.

All state weights and measures offices are concerned with the calibration of test weights of 500 lb, 1,000 lb, or larger with the values based on 50-lb standards. For this reason, with a 50-lb weighing as an example, I will discuss precision of measurement, precision of adjusted values, accuracy, and the effect of errors caused by rounding off written values, particularly their connection with the requirements on accuracy of measurement.

Precision as referred to a balance or scale means the amount within which the results of a weighing may be repeated. Precision as applied to a weight seems to have no meaning. However, the precision of the value of a weight means the amount within which we know the difference between its value and the values of other weights with which it has been compared. Usually by making a least-square adjustment of a half dozen or more comparisons of weights in a set, the precision of the resulting values is increased to about one decimal place better than the precision of the observations.

In order for the value of a weight to be accurate, the value must be known to be a definite multiple or fraction of the value of the International Kilogram. The accuracy is the amount between an upper and lower limit within which the value is known to lie. Accuracy is therefore really the sum of the various uncertainties entering into the value. These include the precision of the adjusted value, or if there is no adjustment, the precision of measurement of the balance or scale, and any constant errors or lack of certainty in the value of the standards. The precision of the value is necessarily known within a smaller amount than the accuracy. The accuracy of the value also cannot be better than one unit in the last significant figure given for the value. However, in carrying additional figures, one unit in the last decimal place may be smaller than the precision of measurement or smaller than the precision of the adjusted value and still be useful. If the number of significant figures given does not exceed the number required to state the accuracy, then errors of rounding off are troublesome.

Since this is an important point, I have chosen as an example the case in which the value of a 50-lb weight, accurate to 1 grain, is rounded off to 1 grain. In this case, the significant figures do not exceed the number required to express the accuracy. The largest error is in the final rounding off, and may amount to 0.5 grain. In the computations we ordinarily work to a factor of 10 beyond the rounded value. If we reserve 0.1 grain to allow a safety factor in the case of small errors of computation and if we reserve 0.1 grain for possible accumulation of rounding off errors in computation, then the discrepancies in measurement must be within 0.3 grain. In order to have discrepancies of only 0.3 grain, the accuracy and precision of measurement must actually be within 0.15 grain. This is approximately one-seventh of the accuracy of the final value as rounded off to 1 grain.

By comparison, if the value is rounded off to 0.1 grain, the computations are ordinarily made to 0.01 grain, the accuracy and precision

of measurement need be only 0.46 grain as can be seen from the following tabulation. This is three times the required accuracy and precision of measurement when the value is rounded off to 1 grain. In other words, the requirements for accuracy of measurement may be reduced by a factor of three, as a result of retaining one uncertain figure in the value.

Effect of rounding off values on required accuracy in measurement

	50 lb+1 grain	50 lb+1.0 grain
Accuracy	1 grain	1 grain
Value rounded off to	1 grain	0.1 grain
Final rounding off	0.5 grain	0.05 grain
Safety factor	0.1 grain	0.01 grain
Error of rounding off in computations	0.1 grain	0.01 grain
Allowable discrepancies	0.3 grain	0.93 grain
Hence required accuracy of measurement (one-half of allowable discrepancies).	0.15 grain	0.46 grain

In establishing specifications for weights, provision must be made for material, surface finish, means of adjustment and sealing, designation of value, storage cases, etc., and tolerances. The basis for establishing tolerances, that is, allowable errors in weights, needs the most explanation.

First, the tolerance cannot be smaller than the inherent accuracy of the weight. This accuracy is limited by any variability in the value of the weight. Variability may arise from such effects as atmospheric corrosion, wear resulting from use, variation in absorbed or adsorbed moisture with changes in relative humidity, and variation in the apparent mass value with change in air density. All of these sources of variability must be considered and made negligible by suitable specifications.

Bare brass weights are permissible for commercial trade weights, but inspectors' test weights must be protected from atmospheric corrosion. Such weights may be handled with the bare hands and must, therefore, have a hard finish, whereas the one-piece reference-type weights may be gold plated and must be handled with special lifters because gold plating is soft and subject to rapid wear. Adsorbed moisture is a consideration in some of the laboratory classes of weights. The most important source of variability in regard to tolerance specifications is the variation in the apparent mass value with changes in air density.

Commercial weighing, as a result of long established custom, is regularly carried out on the basis of apparent mass as compared with normal brass standards (density of 8.4 g/cm^3 at 0° C and coefficient of cubical expansion of 0.000 054/deg C) in air without applying any correction for the buoyant effect of the air. Most weights have densities somewhat different from normal brass; therefore, the buoyant effect of the air upon such weights differs from the buoyant effect for normal brass. As the air density changes, the buoyant effects change, and the value with reference to normal brass appears to change.

Maximum departure from apparent mass versus brass

(In parts per million, milligrams per kilogram, or grams per 143 pounds)

Material	Density	Sea level 0 ft	Location and elevation			
			1,000 ft	Denver 5,280 ft	Mexico City 7,480 ft	Pikes Peak 14,134 ft
	g/cm^3					
Brass	8.6	−0.26	−0.38	−0.85	−1.07	−1.65
Do	8.2	+.25	+.36	+.82	+1.02	+1.58
Stainless steel	7.8	+.81	+1.18	+2.67	+3.34	+5.15
Cast iron	7.0	+2.1	+3.10	+6.99	+8.76	+13.5
Aluminum	2.7	+23.8	+34.8	+78.4	+98.2	+151.5
Platinum	21.5	−6.61	−9.64	−21.8	−27.3	−42.1

The values in this table include effects of local variations in air density and change in air density with elevation. Habitable temperatures and values for relative humidity as would be found indoors were used in these computations.

The tolerance structure must provide for the following multiplying factors between the relatively small inherent variability listed above and the comparatively large commercial tolerances. Class A accuracy must be several times the tabulated inherent variability, and class A tolerances must be several times the class A accuracy. Class C tolerances are 5 times class A tolerances, and commercial trade tolerances are 10 times class C tolerances. The accuracy falls off rapidly for weights below one-half pound. A further multiplying factor is that because of the high ratio of the lever systems, which may be 200 to 1 or greater, the errors of small weights are multiplied when used to counterpoise relatively large platform loads.

In order to be able to determine with a fair degree of assurance whether a weight is in tolerance, the tolerance must be several times larger than the amount represented by the accuracy. If the tolerances are made as small as the inherent variability of the material, the weights may be in tolerance one day and out of tolerance the next.

A second consideration in establishing tolerances is that the tolerances should be of the same order of magnitude as the precision of the weighing apparatus. Weighing errors are necessarily the sum of two groups of errors; one, errors of the weighing apparatus, and two, errors in the weights. For this reason allowable errors or tolerances for weights must have some reasonable relation to errors of the weighing apparatus, neither several times larger nor many times smaller.

There are two ways of describing the accuracy of a set of weights. All weights and all combinations of weights of a set may be said to be accurate within some fixed amount, say 1 grain or 1 mg. As the size of weights increases, the point will eventually be reached where accuracy within any fixed amount, for example, 1 grain, is unobtainable. A second way of expressing accuracy of a set of weights is to say that all weights and all combinations are accurate within

some definite ratio, say 1 part in 100,000. This definition breaks down as the size of the weights becomes small. The precision of a good balance is nearly constant for all loads. Of course there are differences for individual balances, but as a general rule, to weigh to a smaller amount with a smaller load, one must go to a smaller balance. With any fixed ratio, eventually a point is reached as the size is decreased when the accuracy is unattainable. Any tabulation of weight tolerances over a useful range of denominations will require proper consideration of these two conflicting descriptions of accuracy.

Finally, the tolerances must be related to the use to which the weights are to be put; that is, to the requirements of commerce, industry, or science. There are a number of basic differences in the requirements for Commercial and Scientific weights.

One difference has to do with air buoyancy corrections. In scientific work, presumably corrections will be applied for air buoyancy effects whenever applicable. In commercial work, air buoyancy corrections are never applied even in testing weights.

A second difference is in the basic accuracy required. Multiple-lever scales are used commercially with an accuracy of about 0.2%. The tolerances of various commercial classes of weights are set at suitable ratios with reference to the degree of accuracy required for weights used with commercial multiple-lever scales. By comparison, a precision of 1 part in 1,000,000 is readily obtainable with the equal-arm balance. Tolerances for scientific weights should be designed for convenient use with laboratory balances. There is no simple numerical ratio between commercial and laboratory tolerances.

In commercial weighing the net weight is usually a large fraction of the total load. Large capacity weighing equipment is not ordinarily used for small net loads.

By contrast in laboratory work there may be great advantages in weighing a small sample of rare or costly material at comparatively large total loads. A much higher order of accuracy is required in small weights to obtain a reasonable percentage accuracy of small samples.

A third basic difference has to do with the value of material being weighed. In commercial work the costs involved in a weighing must have some reasonable relation to the amount of material represented by the precision and accuracy of the weighing.

For example, if a grocer sells 5 pounds of meat, he cannot afford to pay 25 cents in labor to weigh the meat within a value of one cent. The cost of weighing preferably should not exceed the value of the amount of material represented by the precision of the weighing.

In scientific work the value of costly material may lead to the use of the smallest possible samples, but usually in scientific work the accuracy is not related to the value of the material.

These comments are intended to illustrate the type of problems involved in establishing tolerances and specifications for weights. It should be noted that the weights and measures official need not make any special corrections or allowances for these various factors, since they have been properly considered in establishing the various classes of weights.

REPORT OF THE COMMITTEE ON WEIGHTS AND MEASURES EDUCATION, PRESENTED BY CHARLES MORRIS FULLER, CHAIRMAN

At the Thirty-fifth National Conference on Weights and Measures, Dr. E. U. Condon, President of the organization, proposed that attention be given to how the legitimate needs for weights and measures enforcement activities for different jurisdictions should be estimated. He suggested that it might be well to appoint a committee on budgetary procedures.

In accord with this proposal, the members of the Conference unanimously adopted a resolution recommending that the President either designate one of the present standing committees, or appoint a new committee to carry out these suggestions.

On June 6, President Condon appointed the Committee on Weights and Measures Education, stating that he believed this committee to be the most appropriate for the undertaking.

Your Committee accepted this assignment with enthusiasm which was not dampened by a realization of the amount of work involved. It presented an opportunity to work on a project for the benefit of all concerned; the people who need the protection of adequate weights and measures laws and enforcement, both buyers and sellers; as well as the officials who provide this service.

In order to provide adequate enforcement, the official must have a budget that includes enough manpower and equipment to do a thorough job. The particular object of this Committee, then, would be to establish a yardstick, based on indisputable facts and figures, which could be used to support budget requests. These statistics could be obtained from the officials in charge of representative departments, both large and small, located in all parts of the country.

Our first task was the preparation of a questionnaire that would give us the relevant facts. There was no difficulty in setting up a lengthy list of questions pertaining to the subject, the answers to which would be of value. The problem was to boil these down so that its purpose would not be defeated by being so voluminous that the average official, already burdened by much paper work, would feel inclined to chuck it into that dust-covered file of work to be done some day—perhaps. We were aided by the valuable advice, based on many years' experience of W. S. Bussey and R. W. Smith.

Certain items were basic. These included the population of the jurisdiction, the number of personnel in the department, and the amount of the annual budget. Closely associated with the population was the number of places of business inspected and the official's estimate of how complete a coverage was made.

In making a comparison of the work accomplished by departments, care must be used in selecting those statistics which present an accurate index. A person, without giving the matter too much thought, might consider that the total number of inspections and tests would be a fair basis for comparison. This could be so if it required about the same length of time for the various kinds of inspections. But it takes many times as long to test certain weighing and measuring devices as it does others. For example, one official might test a tremendous num-

ber of small weights and measures, especially in States where these must be tested before they can be sold. The time and effort consumed in testing them is relatively small. It would not be fair to use his totals in comparison with those of another official who did not have anywhere near the proportion of this kind of work.

Computing scales constitute the medium by which practically all of the foodstuffs in groceries and meat markets are sold. The careful inspection of these scales is a leading work in all weights and measures departments. The other leading item is the testing of retail gasoline measuring pumps and meters. We believe that these two items, together with the number of places of business covered, constitute the most reliable index for comparative purposes.

In using these items, we are not overlooking the value and importance of the other work carried on by the departments. Much of this, however, does not follow a routine which would make it possible to evaluate the work accomplished on a basis of figures.

Methods of transportation have changed; large trucks now handle a great proportion of the freight movement throughout the country. Adequate equipment for the testing of heavy duty scales is important. Not so many years ago, wagon scales with a capacity of a few tons were used and it was possible to make a fairly good test with one or two thousand pounds of test weights. But the little wagon scale of yesterday has grown up into the auto-truck scale of today with a 60-foot platform and a capacity of 100,000 pounds. Many of the officials have heavy capacity, motorized testing equipment; others need to give this serious attention.

Along with this movement has been the development of large-capacity petroleum meters. We were able to inspect the small meters with a 5-gallon test measure. The petroleum industry increased the size of the meters at the refineries, on the loading docks, and at the harbor installations. We built test measures of 50-gallon capacity and felt that we had this problem solved, but the companies continued to build larger and larger meters so that the 50-gallon measure has become almost as inadequate at the present time as the 5-gallon measure was a short time ago. According to the recommendations advanced and adopted at our own National Conference, equipment for testing large meters should have a capacity at least equal to the quantity delivered by the meter in 1 minute at its maximum discharge rate. Very few departments at the present time are equipped to comply with this recommendation.

The official's own opinion was requested regarding whether he was able to adequately cover his jurisdiction; whether his offices were well located and satisfactory; and what he needed in men and equipment.

We asked for a copy of his Annual Report, as this would give us information to be used in our study without adding many more questions.

The questionnaires sent to State departments were slightly different from the local questionnaire, inasmuch as the work in so many of the State departments is mostly of a supervisory nature.

A letter was prepared stating the purpose of this survey and assuring the official that the information received from him would be considered confidential insofar as the identity of the department was concerned. We emphasized the fact that this work was being done for

his benefit and that of every weights and measures official. Also, that the value of the survey would depend entirely on the response which we received from him and the others contacted.

Altogether, we mailed 127 questionnaires and letters, personally addressed to the officials in charge. These received a splendid response which speaks volumes for the interest taken in the subject. Our sincere thanks for your cooperation. In the three tables of statistics accompanying this report, you will find information from 77 departments—City, County, and State. This does not represent the total number of returns, as some arrived too late to be used in this report and others failed to forward their Annual Report or to fill in enough of the answers to serve our purpose.

During the coming year, an intensive study will be made of these statistics. We would like to have you also make use of them and send us your comments and suggestions. This survey and the facts which it will set up are needed for the establishment of adequate weights and measures throughout the country. At the next National Conference, we are planning to present, for your consideration, definite proposals and recommendations on budgetary procedures.

The Chairman. That sounds like splendid progress has been made, and it is very very gratifying indeed to know that the Committee has taken hold of this job so thoroughly.

It seems to me that it is one of the important things we might give some thought to. I would like to hear some comments from the floor, if you have any.

Mr. Fuller. Mr. President, I hope that during this coming year each one of you will consider yourself as an unofficial member of this Committee. Study over these facts that we have been able to get. Send your ideas in to us. We will appreciate your assistance.

The Chairman. This is a matter that this Conference ought to give a great deal of attention to, not only this year but in years to come. One of our difficulties is to get the various Government officials, the people responsible for the over-all budget, to appreciate the importance of the work and to understand the needs of the weights and measures activity.

One of the things that this Conference might do, and one which would be most useful, would be to make various studies of this kind, with a view to finding out what the needs are. This is not only true of over-all budget needs but special needs in the way of equipment, questions of uniformity of practice with regard to the standards of personnel employed in inspection work, or uniformity of practice, or desirable standards with regard to subsequent training of people. This is such a specialized field that you seldom find a man trained by some training institution to enter it.

Nearly everybody in this business has to learn the job on the job. There are many questions related to this that I think of as "internal education" as contrasted with "educating the public". These are deserving of very careful consideration and study on a Conference basis. I am delighted that such a good start has been made.

(The report of the Committee on Education was adopted by the Conference.)

(F. C. Yarbrough, Vice President, assumed the Chair.)

State departments of weights and measures

Population	Personnel	Annual budget	Places of business inspected	Number of local departments	Testing equipment for heavy-duty scales	Testing equipment for large meters [1]	Adequate coverage of jurisdiction?	Office satisfactory?	What do you need in men and equipment?
110,000	4	$47,000	1,101	None	Heavy-duty weight trucks	84 gal	Yes	Yes	[2]
300,000	2	[3] 26,700	----	do	2 heavy-duty weight trucks	None	No	No	2 men; panel truck; automobile; large meter prover.
378,000	5	20,500	5,861	do	do	100 gal [4]	No	Yes	More men.
492,000	6	------	15,727	10	None	100 gal	No	No	3 men; heavy-duty weight truck.
550,000	3	15,497	----	None	Heavy-duty weight truck	----------	Yes	Yes	
650,000	3	------	----	3	do	None	No	Yes	2 men; heavy-duty weight truck; large meter prover.
650,000	3	13,000	----	None	State utility commission	----------	Yes	Yes	
841,000	2	------	1,500	238	Heavy-duty weight truck	100 gal	No	No	4 men; 10,000-lb weights; 1,000-gal. unit.
900,000	23	97,443	16,894	None	do	500 gal	Yes	Yes	(Inspections made twice a year).
1,900,000	4	24,000	2,500	Some	Heavy-duty weight truck [5]	None	No	Yes	More men; LPG test; large meter prover.
2,000,000	13	68,850	21,384	None	Heavy-duty weight truck	do	No	Yes	
2,000,000	26	175,000	18,829	"Few"	8 trucks; 5,000-lb wts. each [6]	100 gal	No	Yes	More men and equipment.
2,000,000	7	33,179	2,294	Some	Heavy-duty weight truck	500 gal	No	Yes	2 men; LPG test; large meter prover.
2,200,000	13	42,000	3,747	None	----------	----------	No	------	More men and equipment.[7]
2,500,000	13	43,000	12,000	do	2 heavy-duty weight trucks	Corp. comm	No	Yes	Improved heavy-duty weight truck.
2,734,000	[8] 68	650,000	----	4	Heavy-duty weight truck	1,000 gal	No	Yes	More men.[2 9]
2,846,000	12	------	----	2	do	None	No	Yes	10 men; heavy-duty weight truck; large meter provers.
2,982,000	34	158,000	19,454	1	6 heavy-duty weight trucks	500 gal	No	No	More men; 6 heavy-duty weight trucks; 14 100-gal. provers.
3,270,000	15	84,520	----	16	2 heavy-duty weight trucks	100 gal	No	Yes	5 men and equipment; large meter prover.
3,500,000	10	35,349	9,511	40	Trucks and test weights	100 gal	No	No	4 men; heavy-duty weight truck.
3,921,000	6	------	----	30	2 heavy-duty weight trucks	100 gal	No	Yes	5 men; heavy-duty weight truck; large meter prover.
3,934,000	5	15,000	3,724	3	do	None	No	Yes	(Tests heavy capacity seales only).
4,000,000	70	335,000	57,900	2	do	3 mobile units	Yes	Yes	(9).
4,500,000	17	69,470	3,245	(10)	Heavy-duty weight truck	1,000 gal	Yes	Yes	
4,823,000	21	87,640	----	40	2 heavy-duty weight trucks	100 gal	No	Yes	5 men; heavy-duty weight truck; 1,000-gal. meter prover.
6,000,000	44	[11] 500,000	50,000	33	do	500 gal	No	Yes	2 men; heavy-duty weight truck.
7,000,000	28	325,918	25,000	(12)	3 heavy-duty weight trucks	500 gal	Yes	Yes	
7,650,000	16	------	----	8	5 heavy-duty weight trucks	100 gal	No	Yes	20 men; large meter prover; LPG test.
8,000,000	4	33,800	----	(13)	2 heavy-duty weight trucks	None	No	Yes	Large meter prover.
11,000,000	12	66,000	----	58	3 heavy-duty weight trucks	Counties	No	Yes	5 men; heavy-duty weight truck; 2 LPG test.[2 9]
11,000,000	34	200,000	----	104	2 heavy-duty weight trucks	None	No	Yes	10 men; heavy-duty weight truck; large meter prover.
14,743,000	10	44,094	----	(14)	Cities and counties	100 gal	No	Yes	2 heavy-duty weight trucks.[15]

[1] The capacity of the largest test standard. The department may also have other smaller standards.
[2] Extensive testing of petroleum products for quality. Laboratory and chemists.
[3] $18,850 of this budget was for capital outlay.
[4] Oil companies provide large prover tanks.
[5] Testing of heavy-duty scales is the main work.
[6] Much of the work is in coal mines.
[7] Large sugar industry requires much attention.
[8] 68 inspectors, all or part time on weights and measures. 17 specialize on weights and measures. 10 chemists. 10 or 12 office and supervisory.
[9] Tests Liquefied petroleum gas meters and equipment.
[10] Every city and town has one or more sealers and deputies.
[11] $500,000 for operation entire Bureau. Unable to separate weights and measures.
[12] Cities of 25,000 and over may have departments.
[13] 88 county inspectors and 17 cities.
[14] Each city and each county.
[15] Work is mostly supervision.

City and county departments of weights and measures

(Population under 200,000)

Population	Personnel	Places of business inspected	Were all covered?	Inspections of computing scales	Inspections of retail gasoline pumps and meters	Annual budget	Equipment for testing heavy-duty scales	Equipment for testing large-capacity meters [1]	Adequate coverage of jurisdiction?	Office satisfactory?	What do you need in men and equipment?
28,000	1	280	Yes	170	193	$3,200	500-lb test weights	None	Yes	Yes	
35,000	1	395	Yes	504	230	4,529	2,000-lb test weights	50 gal	No	Yes	Heavy-duty weight truck; LPG unit.
40,000	1	348	Yes	280	367	3,600	1,000-lb test weights	None	Yes	Yes	
45,000	1	575	Yes	451	788	3,535	1,500-lb test weights	50 gal	Yes	Yes	
47,000	1	211	No	521	85	5,128	2,000-lb test weights	None	No	Yes	2 men; heavy-duty weight truck.[2]
49,600	1	650	Yes	509	514	3,700	State truck	50 gal	Yes	Yes	
71,000	2	1,233	Yes	1,070	531	4,655	do	25 gal	No	Yes	Heavy-duty weight truck.[3]
75,000	1	2,000	Yes	549	61	8,053	do	500 gal	No	Yes	3 men; heavy-duty weight truck.
76,000	1	580	Yes				2,500-lb test weights	None	No	No	Heavy-duty weight truck; 100-gal prover.
84,000	2	3,100	Yes	499	398	6,000	do	100 gal	Yes	Yes	
85,000	1	1,470	Yes			6,972	2,000-lb test weights	50 gal	No	Yes	1 man; 200-gal prover.
90,000	1	780	Yes	498	746	3,800	Heavy-duty weight truck	50 gal	No	Yes	1 man.
94,500	5	733	Yes	832	933	20,702	State truck	None	Yes	Yes	[4].
100,000	4	1,000	Yes	841	888	17,990	Heavy-duty weight truck	100 gal	Yes	Yes	
100,000	3	1,250	Yes	736	1,126	10,790	do	100 gal	Yes	Yes	[4].
100,000	1	2,500	No	582	1,013	5,300	do	100 gal	No	Yes	1 man.
110,000	4	1,240	Yes	753	601	15,613	State truck	State 1,000 gal	Yes	Yes	[4].
115,000	5	1,857	No	884	1,959	18,502	Heavy-duty weight truck	200 gal	Yes	Yes	1 man; 1 auto.
115,000	4	1,834	90%	715	256	18,000	do	100 gal	No	No	Vehicle tank calibration unit.
140,000	2	1,800	Yes	1,130	688	8,250	State truck	50 gal	Yes	Yes	
146,000	3		Yes	1,630	1,185	14,780	do	105 gal	No	Yes	LPG test unit.
189,000	3	1,095	No	2,087	1,533	10,925	2,000-lb test weights	100 gal	No	No	2 men; heavy-duty weight truck.

[1] The capacity of the largest test standard. The department may also have other smaller standards.
[2] Also enforces highway load weight laws.
[3] Also public markets and false advertising laws.
[4] Also test taximeters.

City and county departments of weights and measures

[Population over 200,000]

Population	Personnel	Places of business inspected	Were all covered?	Inspections of computing scales	Inspections of retail gasoline pumps and meters	Annual budget	Equipment for testing heavy-duty scales	Equipment for testing large-capacity meters[1]	Adequate coverage of jurisdiction?	Office satisfactory?	What do you need in men and equipment?
203,000	3	1,759	No	4,310	(2)	$14,410	2,000-lb test weights	None	No	Yes	5 men; heavy-duty weight truck; large meter prover.
226,000	7	3,000	Yes	1,740	2,847	39,098	Heavy-duty weight truck	1,200 gal	No	Yes	1 man for investigation.[3 4]
240,000	2	720	Yes	1,900	(2)	10,452	State	State	No	Fair	1 man; office; laboratory.[5]
280,000	6	2,100	Yes	3,006	1,505	27,395	3,000-lb test weights	50 gal	Yes	Yes	1 man; heavy-duty weight trailer.[4]
280,000	7	1,873	Yes	3,964	2,542	31,820	Heavy-duty weight truck	200 gal	Yes	Yes	
300,000	10	6,795	85%	2,276	3,251	41,360	do	100 gal	No	Yes	More men; chemist.[4]
313,000	6	4,941	No	1,748	3,081	28,713	do	50 gal	Yes	No	Additional help.
340,000	11	3,510	Yes	5,110	3,174	41,375	20,000-lb test weights	100 gal	Yes	Yes	
500,000	5	2,650	No	1,482	1,096		Truck and weights	None	No	Yes	2 men and equipment.
520,000	8	3,582	Yes			36,859	State	State	No	Yes	1 man; calibration unit.
536,000	6	6,749	Yes	3,719	3,953	31,034	40,000-lb test weights	200 gal	No	Yes	4 men; heavy-duty weight truck; LPG test unit.
537,000	5	3,150	Yes	3,400	3,700	18,000	State	50 gal	No	Yes	2 men; heavy-duty weight trailer.
633,000	9	7,695	Yes	5,223	3,080	47,945	Heavy-duty weight truck	100 gal	Yes	Yes	
650,000	10	7,800	Yes	4,915	7,398	52,162	do	500 gal	Yes	Yes	Office space; calibration unit [4].
734,000	19	22,765	Yes	5,987	10,308	93,048	Truck; trailer; weights	500 gal	Yes	Yes	
760,000	8	12,574	Yes	6,439	3,369	44,523	State	50 gal	No	Yes	2 men; heavy-duty truck; large meter prover.
800,000	19	14,000	Yes	6,136	2,614	78,200	Heavy-duty weight truck	100 gal	Yes	No	Office space; calibration unit; large meter prover.
853,000	17	6,507	Yes	9,080	6,974	55,491	Truck and weights	50 gal	Yes	Yes	Calibration unit.
900,000	16	12,668	Yes	11,182	3,517	49,316	Heavy-duty weight truck	Master meter	Yes	Yes	
942,000	13	17,715	Yes	7,934	2,950	37,619	Truck and weights	1,000 gal	Yes	No	2 men.
1,800,000	21	19,440	50%	10,471	11,473	81,530	Heavy-duty weight truck	500 gal	No	Yes	6 men; 3 autos.
2,000,000	90	42,569		19,885	22,742	290,552	20,000-lb test weights	None	Yes	Yes	
4,198,000	44	41,270	90%	32,042	33,906	188,089	Heavy duty weight truck and trailer.	800 gal	No	Yes	4 men and equipment. [3 4 6]

[1] The capacity of the largest test standard. The department may also have other smaller standards.
[2] State inspects gasoline pumps.
[3] Has LPG test unit.
[4] Has good vehicle-tank calibration unit.
[5] Also certifies utility meters.
[6] Also extensive testing of petroleum products: Laboratory, 4 men, including 2 chemists.

BELT CONVEYOR SCALES

By Leonard Maguire, *Works Manager, Fairbanks-Morse Company, St. Johnsbury, Vt.*

During the past few years we have noticed an increase in interest by industries in the advantages of weighing material in motion on a belt conveyor for which a special weighing machine known as a belt conveyor scale is being offered. It is not surprising therefore that this field of weighing should now become important to the members present here today. We as a manufacturer are pleased to accept this invitation so kindly extended to us to contribute our knowledge and experience on this subject.

The thought has been expressed by some that the belt conveyor scale should be considered a commercial scale and come within the regulations covering commercial weighing equipment as defined in Handbook 44. Before attempting to classify belt conveyor scales, it is both prudent and wise to marshall our facts quite completely before we attempt to rationalize our conclusions.

There are several types and kinds of belt conveyor scales, and they are used in almost every conceivable kind of service. All of these scales may be broadly classified into one group defined as units which record the amount of material conveyed on an endless belt which is in continuous motion. For the purpose of this discussion we shall break this broad group down into two more general classes. First, that group which includes all "feeder type" models which regulate and register a "constant" feed, and second, that group which includes the continuous totalizing units which integrate the belt speed and weight increments. This latter group, because of its principal of integration, permits the recording of varying loads. At the present time the interest in belt conveyor scales concerns that continuous flow integrating type.

Before promoting the desirability or possible undesirability of classifying this a commercial scale, it is necessary that we more closely consider its nature. It is a mechanical device and therefore one basic question must be answered. "Does the machine do the job for which it was designed?" To the average layman not versed in automotive engineering it is sometimes mystifying how a large transport truck with a moderate horsepower engine can haul a heavy load up a hill when a higher horsepower passenger car has trouble with a lightly loaded trailer. The engineering elements in each automotive unit are the same, but the difference in performance is due to the fact that each is designed to fulfill a purpose and therefore a different service is to be expected.

We may now liken this example to our belt conveyor scale installations in that we have engineered a scale to perform a certain task but we cannot necessarily expect this unit to have the same performance characteristics as other weighing machines designed for and working under other operating conditions.

To point out specific facts that so far we have only been hinting at, let us break down the classification of continuous flow integrating scales into two final groups, which we shall call the "self-contained" and the "built-in" types. By the self-contained we mean those units which contain their own endless conveyor belt, drive motors, etc. and

are inserted in a productive system only for the purpose of weighing the material being conveyed. The built-in type is that in which the conveyor scale has been located at some point in a conveyor system primarily intended to transport materials from one point to another and from this system the conveyor scale utilizes the belt to impart the weight and speed factors to the integrating mechanism.

When we consider the wide spread usage of built-in belt conveyor scales, in everything from iron mines and open pits to interplant conveying of a self-enclosed system we can readily appreciate that the usual three basic factors common to nearly all products confront us. They are:

1. Manufacturing perfection.
2. Perfect maintenance.
3. That factor over which we have little or no control, the forces of nature.

The problems in the manufacturing category are not too difficult because in this instance the manufacturer has fairly accurate control over all processes. The major point to be considered in this is in the economics involved to hold the tolerances necessary to meet operational requirements.

That part of the problem wherein the accuracy of the unit depends upon its maintenance is a responsibility of both the manufacturer and the operators. It is, of course, necessary that the product be so constructed that maintenance can be carried on with a minimum of effort but the final responsibility lies with the owner to see that the product is maintained in the condition necessary to uphold the accuracies which the manufacturer built into the unit.

That final factor, the forces of nature, is the one which can be a real annoyance. Try as hard as we might to build a precision piece of equipment and given a reasonable degree of maintenance, we are still confronted with those elements of wind and rain, heat and cold, snow and dust storms and kindred other forces which tax our ingenuity in designing control mechanisms. The self-contained type of belt conveyer scales does give more latitude in providing some measure of control over many of these natural elements but the built-in type gives us little opportunity to provide corrective measures.

The various mechanical conditions such as belt tensions, friction, resistance of rollers and variations in belt inclines are directly influenced by the varying weather conditions of rain and sunshine, dust, abrasive and corrosive atmosphere. Any change in any of these variables has a pronounced influence on the calibration of the integrating unit of the belt conveyor scale.

In our present practice we have accurate means of calibrating belt conveyor scales by the use of the so-called "test-weight train" which is used to simulate various loading conditions of the belt. However, when we consider that a belt conveyor scale is actually weighing very small loads in a very short time and totalizing these very small units we can no longer use the current accepted methods of checking the accuracy of the unit. The factor of "time" becomes all important. In all other scale applications the weighing mechanism is permitted a certain amount of time to reach a stage of almost perfect equilibrium before the weight indication is established but the continuous motion weighing of a conveyor system is not permitted this latitude. This

would be analogous to weighing several hundred very small loads on an accepted commercial scale and totalizing these loads, and then check weighing the bulk on a higher capacity commercial scale. The comparison of weight recordings would obviously not be the same, yet to all intents and purposes all weights were recorded on commercially accurate scales.

We feel, therefore, that the belt conveyor scale today of the built-in type is doing an admirable job in the duty for which it has been designed, that of bulk weighing and check weighing, but we would hesitate to recommend that any commercial tolerances be assigned to these units until a more rigid analysis has been made of all the factors influencing the recordings in the many, many fields of application of these units.

Mr. Christie. Mr. Maguire mentioned the fact that there has been an attempt to classify these conveyor scales, continuous weighing machines, as commercial devices. In our State of New Jersey I think I am safe in saying that a great many of these machines have been in use as check weighing machines either in the industrial pattern or in the receipt of incoming material.

In the past few years, however, the labor element in cost per hour, as well as the cost of the material itself, has led industry to attempt to bring these machines into the classification of commercial devices.

That has posed a problem in several instances in our State because the initial layouts of the machines have not lent themselves to very highly efficient manners of checking them for approval as commercial devices.

I would appreciate it if Mr. Maguire would give us some suggestions as to how field tests of these devices should be made as required for commercial purposes.

Mr. Maguire. Of course that is the main difficulty today, to arrive at some sort of a standardized test procedure which you can rely on in spite of all the varying conditions which you have. As I mentioned before, the built-in type of scale, which is the most popular, is installed in various systems which were primarily for transporting material and not always designed for the job, and you have so many variable factors, you can calibrate your scale for certain simulated mode of conditions.

The type of loading and the tension on the belt changing and that sort of thing, which goes on, makes it very difficult to set up a standard procedure or standard test which you would have to do if you were going into the class of commercial scales.

There is really not much comparison between a normal scale as we know it and the belt conveyor scale of today, because of its totalizing feature. I say that is particularly true of the built-in type. With the self-contained type you have quite a lot of latitude. You can get better operating conditions.

Actually your belt conveyor scale, although it is a scale, is also a measuring device. If you are familiar with Handbook 44, you will find several paragraphs about the measuring devices, liquid measuring devices, and you will note in those regulations that they set certain minimum and maximum or standard conditions.

That is the thing that would have to be done if and when, after all the considerations are made, it were later on to be classed as a com-

mercial scale. We have to have standard procedures which today the manufacturers are trying to arrive at, but I don't know how soon it will be.

For instance, in relation to liquid measuring devices, in Handbook 44 there are a couple of provisos which I quote here:

> The wholesale device shall be readily operable to deliver accurately any quantity from 50 gallons to the capacity of the device.

You see they have a low limit there. Then you will find in another place:

> The normal test of a commercially-installed meter or meter-type device shall be made at the maximum discharge rate * * *.

A belt conveyor scale running at its maximum rate is much more accurate than at half load or a quarter load, or a third load. So that if and when it ever became classified as a commercial scale, there is certainly a lot of work to be done to reduce the whole testing procedure to standard conditions.

MR. BAUCOM. Would it be practical if we were to have 1 ton of 50-pound weights and put them on a belt and let them go across and see what the registration would be? Would that be a practical test or would that be unreasonable?

MR. MAGUIRE. It has been done. We have found after several years that we can do better in calibrating a scale by means of a chain. Now we have a little train of cars about 6 inches long and about 30 or 50 of them, to extend beyond the weigh length. On each of those cars we have a spindle whereby we can set a regular weight of 1 pound, 5 pounds, 10 pounds, or whatever it may be, and stack them up to simulate the varying loading conditions.

The chain, of course, is anchored on one end, and the belt moves. That simulates a moving load. Handling the test weights is really not very convenient. We get the same condition, you see.

I would like to leave this one thought with you before I go. Primarily, the belt conveyor scale is built as a processing scale. In a way, you might call it an averaging device. Even though its efficiency will drop off at various loadings, over a period of 8, 10, or 15 hours a day, the results are very consistent.

It is a processing scale. Some day it may develop into a commercial scale, and in some cases there are conditions that are such that it could almost be classified as a commercial scale.

But generally speaking, it is strictly a processing or industrial machine.

NPA REGULATIONS AND WEIGHING AND MEASURING DEVICES

By R. W. MURPHY, *Assistant Administrator for Industry Operations, U. S. Department of Commerce*

(Mr. Murphy described briefly the functions of the Office of Defense Mobilization and other defense agencies. He explained in some detail the operations of the National Production Authority, with which he is personally connected. He explained the various orders and regulations that have been issued thus far, and emphasized the fact that the No. 1 task is to always take care of the requirements of the military.

A question and answer period followed Mr. Murphy's talk. During the discussion it was brought out that the Government intends to do all that is practicable to provide the necessary materials for repair parts and replacements

in the weights and measures field. It will be expected that present devices be made to serve as long as practicable, with proper maintenance. An order has been issued which is designed to make necessary repair parts available at this time. The following discussion took place subsequent to Mr. Murphy's talk.)

Mr. Rogers. As I recall, during the last war period the War Production Board indicated to us that we should be very careful about what equipment we condemned and how much of it we condemned. What they urged at that time was a modification of our condemnation procedures. They said that if you take certain equipment away from these people, you will be virtually putting them out of business, because they won't be able to get it. That applied to scales and pumps in the petroleum industry.

We modified our operations considerably. Certain equipment, which under ordinary conditions we would condemn, confiscate, or remove from use, was kept in service. They maintained it after a fashion. After the war ended, we expected more replacements than we got, too. The program rather fell down. I wonder what your agency is going to do. Are you going to urge that we do not do our work fully? That we modify and be restricted?

Mr. Murphy. I would say yes, we would be anxious to have you do that right now. That is one of the reasons this Regulation 4 was issued, to provide parts for maintenance and repair of existing equipment, and the prime purpose was to save the raw materials necessary to build new equipment.

Mr. Sanders. I think Mr. Rogers is speaking of equipment that has been determined to be beyond repair. It cannot be put back into proper condition. They never confiscate or condemn a device until it is beyond repair. If it can be repaired, they just allow it to be repaired.

Mr. Murphy. Our attitude, even in World War II, was to provide materials for the replacement of items of that type, where we have proper certification from the examining official. We have, and did, and I am sure will continue to issue materials for that purpose. However, we would suggest some caution wherever possible.

(The Conference was adjourned, to reconvene at 10:00 a. m., Thursday, May 24, 1951.)

(On the evening of Wednesday, May 23, an informal party was held at Wardman Park Hotel, the Conference headquarters, for those attending the Conference.)

FOURTH SESSION—MORNING OF THURSDAY, MAY 24, 1951

(H. E. Howard, Vice President, presiding)

REPORT OF THE COMMITTEE ON LEGISLATION, PRESENTED BY R. E. MEEK, CHAIRMAN

(Secretary's Note.—This Committee Report is presented in full with the exception of the revised text of the Model State Law on Weights and Measures, which is too lengthy to be included in this publication. Upon request, the full text of the Model Law, as revised, is available from the Office of Weights and Measures, National Bureau of Standards, Washington 25, D. C.)

MODEL STATE LAW ON WEIGHTS AND MEASURES

The activities of your Committee on Legislation, since the adjournment of the Thirty-Fifth National Conference on Weights and Measures, had to do largely with the study of the Model Law on Weights and Measures and the preparation of a suggested revision. Attention was also given to the Model Weighmaster Law tentatively adopted by the Thirty-Fifth National Conference. While this report will cover both of these matters, your consideration will first be asked of that part of the report pertaining to the proposed revision of the Model Law in each of its three forms.

In recognition of the criticisms occasionally offered with regard to the text of the Model Law, the Committee has prepared a suggested revision and, following customary procedure, is offering it to this Conference for whatever action the Conference may deem advisable.

Since the organization of the National Conference on Weights and Measures, which took place in 1905, the importance of uniform weights and measures legislation has been recognized. It was inevitable that the Conference should make some official recommendations on the question of State legislation, if it was to be of maximum assistance in bringing about the enactment of weights and measures laws which would be considered strong, progressive, adequate and, at the same time, uniform.

In recognition of its responsibilities, the Conference, during its second meeting, adopted a resolution instructing the executive committee to draft a model set of laws to be considered at its next meeting. In accordance with this resolution, the executive committee prepared a set of suggestions which were adopted by the Conference. The next step to be taken in this direction was the adoption of a Model Law in 1911. From time to time, the Conference has adopted amendments to the Model Law with the result that today we have three forms of this Law known as Form 1, Form 2, and Form 3.

The Committee strongly favors the retention of the three forms of the Model Law in order to best meet local conditions. For the information of the Conference, we quote from Handbook 26 of the National Bureau of Standards a brief description of the three forms and of the local conditions in which each will be found to be peculiarly applicable:

Form 1.—This form provides that all weights and measures supervision in a State shall be exercised by a State department, the weights and measures laws being wholly enforced by officers in the service of the State.

This form is intended primarily for States having a comparatively small population per unit of area and few or no larger centers of population, and secondarily, for those States in which it is believed that the law can be most competently enforced by a single central organization.

Form 2.—This form provides that the State shall take entire charge of the enforcement of the Law in those portions of the State in which the population per unit of area is so small that enforcement by local authority will not be fully efficient, and that in those cities and counties of the State in which the populations are large enough to justify them, local inspection services under the supervisory authority of the State shall assume the enforcement of the Law.

This form is primarily intended for those States having part of their territory thickly settled and other parts only thinly settled.

Form 3.—This form provides for the enforcement of the law by local officers in each city and each county, all under the general supervisory control of a State department of weights and measures.

This form is intended for those States having a large population per unit of area and but few or no sections which are thinly settled.

The proposed revision of the Model Law has been undertaken as a result of recent experiences of State and local officials and legislative committees in connection with their efforts to bring about the enactment of weights and measures legislation. It has been found that the length of the text of the Model Law is so great as to discourage both officials and legislators; the demand is for something which is short and readily understood. Another difficulty is that in its present form the Model Law is not susceptible of ready modification to limit it to basic requirements. It is believed the law should be so written as to meet the needs of jurisdictions desiring to enact, in the original instance, only those provisions which are essential for the establishment of an adequate system of weights and measures control and leave to later enactments the strengthening of the law to include numerous "refinements".

A critical study of the Model Law discloses that the language is frequently involved and repetitious, that there are included a number of provisions which seem no longer to be necessary, and that the order in which the sections are presented is to some extent illogical. In undertaking a revision of the Model Law for consideration by the National Conference, the effort was to (1) shorten and simplify the language wherever practicable, (2) avoid repetition, (3) delete provisions no longer needed, (4) strengthen the provisions where this seemed advisable, (5) group related provisions in the same section or in adjacent sections, and, (6) arrange the sections in a logical order and one which would lend itself to the convenient elimination of sections when a short-form law is desired.

Mention may be made of a few of the specific differences between the proposed revision and the original text. The prescribed title of the administrative officer is limited to "superintendent", the parenthetical reference to "commissioner" is wholly omitted. The expression "weights and measures" has been substituted for the expression "weights and measures and weighing and measuring devices", "devices" being adequately covered by the terms of the definition of "weights and measures". Side titles have been supplied for each section.

A basic change is the requirement that commercial apparatus be tested annually, rather than semiannually as provided in the present form of the Model Law; this change is believed to be in line with present-day thinking and practice in most jurisdictions. All the amendments which have been adopted by the National Conference up to the present time have been incorporated in the proposed revision. In line with the provisions of paragraph G–A.1. of Handbook 44, the proposed revision associates "payment" for services with "charges" for services. The definition of "in package form" has been considerably modified to meet conditions which have recently developed and objections advanced against the original language. Other differences consisting of deletions, additions, and modifications will be apparent upon careful comparison of the proposed revision with the corresponding language of the present form of the Model Law.

Attention is called to the fact the proposed revision groups in sections 24 to 31, inclusive, those provisions dealing with specific commodities. This group of eight sections comprises a portion of the total text which can be eliminated in whole or in part in a jurisdiction desiring to enact only the necessary basic provisions of a weights and measures statute. Section 32 also is a section which can be omitted in the circumstances just mentioned. In other words, if it were desired to draft a bill containing the essentials for the creation of a weights and measures organization and for the establishment of an adequate statutory foundation for the work of such an organization during the first several years of its existence, sections 1 to 23, inclusive, and sections 33 to 37, inclusive, with the latter group being appropriately renumbered, would provide an adequate short-form bill.

Your Committee recommends that the Conference consider Form 2 of the Model Law as the basic form to be presented in full. This appears to be logical in view of the fact the combination of State and local organizations which is provided for by Form 2 is the system in most common use. To effect economy in printing, sections in Form 1 and Form 3, which are substantially the same as those found in Form 2, are shown by reference. Sections which differ materially are given in their entirety.

For your convenience in comparing the text of the present Form 2 of the Model Law with the proposed revision, your Committee offers the following section-by-section explanation.

An enacting clause is added.

Sec. 1. Follows present Section 1, but includes also portions of present Sections 2 and 5, in order to bring together the provisions relating to the State standards.

Sec. 2. Follows present Section 2, but the requirement for stamping office and working standards is eliminated as being objectionable in some cases, and the requirement relative to the use of the office and working standards is eliminated as being unnecessary.

Sec. 3. Includes all of the provisions of present Section 33, and also new provisions relative to barrels of lime and barrels for fruits and vegetables.

Sec. 4. Replaces present Section 3. The form of organization provided for follows the modern trend of consolidation of State activities into major State departments. Provision is added for the purchase of equipment and supplies.

Sec. 5. Follows present Section 4, but the reference to surrender of the standards by the superintendent to a successor is eliminated as being unnecessary.

Sec. 6. Combines portions of present Sections 5 and 7, but reference to a receipt for the standards when these are turned over to a successor is eliminated as being unnecessary.

Sec. 7. Follows present Section 6.

Sec. 8. Includes the remaining provision of present Section 7, except the one relative to the appointment of special deputies, which is eliminated as being unnecessary and objectionable.

Sec. 9. Follows present Section 8, but the directive to prosecute is eliminated as being objectionable, and the provisions relative to right of entry and stoppage are transferred to new Section 11.

Sec. 10. Includes all of the provisions of present Sections 9 and 10, and also new provisions relative to the use of repaired apparatus and the disposition of apparatus not repaired.

Sec. 11. Follows present Section 19, and includes the provision relative to right of entry and stoppage transferred from present Section 8.

Sec. 12. Follows present Section 11.

Sec. 13. Combines provisions of present Section 12 and Section 13 and makes certain changes relative to appointment of county and city sealers.

Sec. 14. Follows present Section 15 but provides premiums on bonds be paid by city or county as the case may be.

Sec. 15. Follows present Section 17, but limits jurisdiction of county sealer and gives authority to the superintendent to require reports from local sealers.

Sec. 16. Follows present Section 16.

Sec. 17. Follows present Section 14.

Sec. 18. Follows present Section 22.

Sec. 19. Follows present Section 24 insofar as declaring net contents on packages of commodities.

Sec. 20. Follows present Section 25.

Sec. 21. Replaces second paragraph of present Section 24 and which had to do with the definition of a commodity in package form.

Sec. 22. Replaces present Section 36.

Sec. 23. Follows present Section 35.

Sec. 24. Follows present Section 28 but includes fish among those foods specifically required to be sold by weight.

Sec. 25. Follows present Section 29 but includes sliced bread in definition of a loaf of bread.

Sec. 26. Replaces present Section 27, excludes one- and one-half pound standard, and simplifies language.

Sec. 27. Replaces present Section 30 and provides that milk, cream, etc., be packaged in certain standard units.

Sec. 28. Replaces present Section 34 and includes corn meal, special flour mixes, provides standard weights, and exempts small packages.

Sec. 29. Follows present Section 23 but makes certain exceptions with respect to coal sold in package form.

Sec. 30. Text adopted by the 35th National Conference and has to do with textile products.

Sec. 31. Shortens the text and simplifies language of present Section 32.

Sec. 32. Is the same as present Section 31.

Sec. 33. Follows present Section 20.

Sec. 34. Follows present Section 21.

Sec. 35. Follows present Section 37 but more clearly sets out and enumerates violations of the act.

Sec. 36. Follows present Section 38.

Sec. 37. Follows present Section 39.

Since the proposal being submitted calls only for a revision of the present Model Law, and the subject matter has been given careful consideration during previous Conferences, your Committee recommends final adoption at this time.

MODEL WEIGHMASTER LAW

In recognition of the fact that the Model Weighmaster Law was tentatively adopted during the Thirty-Fifth National Conference, your Committee has given it further study preparatory to recommending its final adoption. As a result of this study, the Committee is now prepared to offer the following amendments for your consideration:

1. That the title of the administrative officer be limited to "Superintendent" and that any parenthetical reference to "commissioner", wherever it may appear in the law, be wholly omitted.

2. That where "and/or" appears in Section 10, the "and/" be stricken from the law.

3. To provide for the following enacting clause "Be it enacted by the Legislature of the State of _____."

4. To strike out the caption and leave its preparation to the authorities in the individual States where it might be introduced.

If the foregoing suggested amendments are adopted, the Model State Law on Weights and Measures will be uniform with respect to these features.

Your Committee recommends the adoption of the foregoing amendments and, when so amended, the final adoption of the Model Weighmaster Law.

(The report of the Committee on Legislation was adopted by the Conference.)

RETAIL SALE OF BAR SOAP

By G. H. Leithauser, *Senior Assistant Superintendent, Division of Weights and Measures, City of Baltimore, Md.*

At the Thirty-Third National Conference on Weights and Measures, the recommendations of the National Conference Committee on Methods of Sale of Commodities in regards to soap and soap products were as follows:

Item 15. Soap (liquid): Should be sold by liquid measure.
Item 16. Soap (in cakes or bars): Should be sold by net weight.
Item 17. Soap Powders and Flakes: Should be sold by net weight.
Item 18. Cleansing Fluids: Should be sold by liquid measure.
Item 19. Detergents (liquid): Should be sold by liquid measure.
Item 20. Detergents (solid or powder): Should be sold by net weight.

The Committee also stated that these commodities, when sold in package form, should have the net quantity of contents declared by plain and conspicuous markings in terms of avoirdupois net weight, liquid measure, or numerical count according to the classification in which they properly belong. Where any package subject to weight stipulations contains any article other than the represented commodity itself, the quantity declaration shall be exclusive of such article. This latter provision was adopted because in some packages, such as soap powder for example, a towel or a wash cloth or some other item may be included. The Committee wanted the package declaration to apply only to the essential commodity contained in the package. These recommendations were duly adopted by the Thirty-Third National Conference on Weights and Measures.

Mr. Rogers also stated in this report, and I quote—"The soap industry during the war was able to get exemption from weight requirements for bar soap, which concession, it is understood, was granted because of the moisture content in such soap. This concession appears to have been inconsistent when considered in relation to other industries packaging other essentials with high moisture content."

At the Thirty-Fourth National Conference on Weights and Measures, the Committee on Methods of Sale of Commodities, in regards to bar soap, reported as follows:

4. Bar Soap (bars and cakes)—This subject was covered in Item 16 of your Committee's report to the Conference in 1947, wherein it was recommended that soap in bars and cakes should be sold by net weight. This would, of course, predicate that when in package form the quantity of contents would be declared, consistent with the principles of net-weight declaration requirements as applied to other commodities.

The soap industry has since reopened the issue by representations to the Committee and requested further study and consideration. They submitted a brief covering their contentions that bar and cake soap should be exempted from sale by weight and marking requirements, basing their arguments mainly on the factor of moisture content, which according to the character and quality of soap as produced for various purposes is variable, and that as a consequence, cakes of soap, identical in weight and character when cut at the factory level, vary greatly in weight when sold to the consumer. Other points of argument presented are:

(1) That it would be impossible to comply with regulations with respect to tolerances when applied to soap in bars and cakes.

(2) That the expenditures required for weight markings on packaged bar soap would add millions of dollars to the cost.

(3) That the public, though charged with this heavy expense, would in no way benefit from net-weight markings on bars of soap.

(4) That the requirement would create burdens for retailers that might become intolerable.

(5) That nowhere in the United States are cakes or bars of soap required to be sold or marked by weight.

These contentions were exhaustively amplified by supporting data in the industry's brief. They have been fully reviewed by your Committee and, in addition, a subcommittee comprised of two of our group visited one of the outstanding soap-manufacturing plants in the country, that of the Colgate-Palmolive-Peet Company at Jersey City, N. J., for an on-the-spot study of manufacturing processes and procedures inherent in soap production.

The Committee has since had a hearing attended by a representative group from the soap industry and all phases of this question were reviewed. As a concluding argument presented to us at this meeting we were shown two cakes of imported soap—one small and the other about twice as thick. The small one was much heavier for its size than the large one; it seems that it had been loaded with some inert matter having no detergent value, and

this sort of thing can be done by anyone wishing to do it. The Committee is now of the opinion that soap is a product which should be treated in a special manner and has concluded that nothing is to be gained for the consumer by requiring sales by weight or by endeavoring to mark the package of bar soap in terms of weight. Therefore, the Committee withdraws its original recommendation that bar soap be sold by weight and recommends that no action be taken by the Conference at this time with respect to marking requirements or methods of sale of bar or cake soap.

From the foregoing recommendations of the Committee, you can see that much has been said for and against bar and cake soap being sold on a net weight basis.

The American Society for Testing Materials in 1939 adopted standard specifications for ordinary bar soap. These specifications cover ordinary bar soap suitable for use with moderately hard water for general cleaning and laundry purposes. The ASTM specifications read as follows:

GENERAL REQUIREMENTS

2. (a) Ordinary bar soap shall be a well-made, uniformly mixed, bar soap, made from soda and fats, with no excessive proportion of rosin and a moderate amount of matter insoluble in alcohol.

(b) Odor.—The odor shall not be objectionable in the soap as received or in a hot solution of the soap in water. The material shall not leave objectionable odor on dishes or other objects after washing with a water solution of the soap and rinsing thoroughly with hot water. If desired, the odor of the material under the above conditions shall conform to the odor of a sample mutually agreed upon by the purchaser and the seller. The sample mutually agreed upon shall be kept in an airtight, closed container for comparison with samples from deliveries.

CHEMICAL COMPOSITION

3. Ordinary bar soap shall conform to the following requirements as to chemical composition. The percentage of matter volatile at 105° C shall be calculated on the basis of the soap as received, but all other constituents shall be calculated on the basis of material containing 36 percent of matter volatile at 105° C.

Moisture and matter volatile at 105° C, max, percent	36.0*
Sum of free alkali or free acid, total matter insoluble in alcohol, and sodium chloride, percent	2.0 to 10
Free alkali, calculated as NaOH, max, percent	0.5
Free acid, calculated as oleic acid, max, percent	0.5
Matter insoluble in water, max, percent	1.0
Rosin acids, max, percent	25.0
Chloride calculated as NaCl, max, percent	1.0
Anhydrous soap content, min, percent	52.0

*Deliveries which yield more than 36 percent of volatile matter shall be rejected without further test.

BASIS OF PURCHASE

4. Ordinary bar soap is subject to a possible gain or loss of weight, depending on atmospheric or storage conditions, or both, or on packaging, as a result of fluctuation in the moisture content. Changes in the moisture content result in a corresponding change in the percentage of total solids or anhydrous soap content, or both.

(a) The material shall be purchased by net weight, provided the matter volatile at 105° C is neither above nor below 34 percent.

(b) Deliveries containing more than 36 percent of matter volatile at 105° C shall be rejected without further test.

(c) On deliveries containing less than 36 percent of matter volatile at 105° C, settlement shall be made on the basis of a product containing 34 percent moisture, that is, 0.66 lb of nonvolatile matter shall be considered 1 lb of soap.

(d) When the material conforms to these specifications on a calculated 36 percent moisture and volatile matter basis, the net weight of the material to be paid for shall be calculated as follows:

$$W=\frac{R\times(100-L)}{66}$$

where

W=net weight of material to be paid for on 34 percent moisture and volatile matter basis

R=net weight of material as received

L=percentage of loss at 105° C.

METHODS OF SAMPLING AND ANALYSIS

5. The material shall be sampled and analyzed in accordance with the Standard Methods of Sampling and Chemical Analysis of Soaps and Soap Products (ASTM Designation: D 460) of the American Society for Testing Materials. The purchaser reserves the right to use any additional available information to ascertain whether the material conforms to these specifications.

After 9 years of experience these specifications were reapproved by the ASTM in 1948 without change. In 1949 these same specifications were approved as an American standard by the American Standard Association. The ASTM Committee on soaps and other detergents, at this time, consists of 106 members: 52 of these members represent producers, 29 represent consumers, and 25 represent general interests. Among some of the representatives for producers on the Committee are L. T. Howells, representing the Beach Soap Co.; E. W. Blank; M. F. Graham; W. W. Sweet and J. A. Woodhead, representing the Colgate-Palmolive-Peet Co.; R. E. Hauber and C. P. Long, representing Procter & Gamble Co.

The American Standards Association was organized in 1918 by the present four Founder Societies and the ASTM. Its chief function is to provide a means for industry, technical organizations, and Governmental departments to work together in developing national industrial standards acceptable to all groups. It was formed to provide a means whereby standardizing organizations might coordinate their work and thus prevent duplication of effort—a clearing house for standardization.

If these specifications are good enough for such organizations as the ASTM and the American Standards Association and for the large users of bar soap, they certainly could be adopted by weights and measures officials to protect the small purchaser of bar soap. From the foregoing specifications set forth by the ASTM after 9 years of experience with this problem, and reapproved by them in 1948 without change, it appears to me that this Conference should again reconsider this problem of requiring weight markings on packaged bar soap.

I feel that the Committee on Methods of Sale of Commodities, after a further study of this problem, using the ASTM specifications as a guide, would find that the arguments set forth by the soap manufacturers, at the Thirty-Fourth National Conference, that bar and cake soap should be exempted from net weight markings, would become null and void.

Answering the soap manufacturers' contentions, as previously stated in this paper, that bar and cake soap should be exempted from sale by weight markings requirements, I propose that:

First, with the ASTM specifications as a guide and with a net weight and anhydrous or volatile marking on the package, it would be practical for the soap manufacturers to comply with regulations with respect to tolerances when applied to soap in bars and cakes.

Second, the expenditures required for weight and anhydrous markings on package bar soap would be practically nil.

Third, the public would benefit from net weight markings on packaged bars of soap in the same manner in which they now benefit from net weight markings on any other commodity packaged.

Fourth, net weight markings on packaged bar soap would create no more burden for retailers than the net weight markings on other packaged commodities. The only equipment the weights and measures officials would need to ascertain if bar soap was marked correctly and to ascertain if it was packed short in weight, would be an analytical balance and an oven. The analytical balance, I believe, all weights and measures departments already have. The cost of an oven is relatively small. Any tests which weights and measures officials would make to ascertain if the net weight markings on bar soap were accurate, and any discrepancies that would occur would be in the favor of the manufacturer.

The ASTM and the American Standards Association *recommend* that ordinary *bar soap shall* be *purchased* by *net weight*, provided the matter of volatile at 105° C, which is the equivalent of 221° F, is neither above nor below 34 percent.

To exempt the soap manufacturers from net weight markings on bar soap has established a bad precedent which should now be corrected. We, as weights and measures officials, must be fair in our dealings with the soap manufacturers, but to grant concessions wholly exempting them from weights and measures supervision and control, just because they have a product with a high moisture content, is entirely unfounded. Other dealers of various commodities, such as frozen foods, flour, fish, certain cheese products, smoked meats, dried fruits, pickled products, roofing, etc., have their shrinkage and marking problems too, but because they had a problem to solve, the Committee on Methods of Sale of Commodities did not exempt them from weights and measures supervision. For example, the Committee recommended that, for dried fruits, when in package form, the quantity declaration should be in terms of net weight only and no qualifying term or statement, such as percentage of added moisture, be recognized. Regarding roofing products, it recommended that a standard of measure for roofing be established on the basis of coverage. Certain other commodities were recommended to be sold on a drained net weight basis. Why, then, cannot some such recommendation be adopted, such as marking soap as to its net anhydrous weight?

At a hearing before the City Council of Baltimore, Md., on Ordinance 2109 and before the Members of the Finance Committee of the Maryland State Legislature on Senate Bill 159, the American Soap & Glycerine Producers Association, using the Committee on Methods of Sale of Commodities report as recommended to the Thirty-Fourth National Conference on Weights and Measures, succeeded in having an amendment inserted in both bills, which amendment provided that

"Nothing in this act shall be construed to apply to or affect in *any manner* the *packaging* or the *sale* of any *form* of *soap*, *soap products* or *detergents*."

Their attorney emphatically stated at Annapolis, Md., that the American Soap & Glycerine Manufacturers were preparing bills to be presented to all State legislatures eliminating *bar soap* and *soap products* from *all weights and measures legislation*, and he wasn't interested in any compromise which would eliminate *bar soap only*.

C. D. Baucom, Superintendent of Weights and Measures Division for the Department of Agriculture, State of North Carolina, wrote me that a rider to a bill introduced in the North Carolina Legislature a few years ago carried the last proposal of Roy Peet's brief, which Mr. Peet submitted to the Committee on Methods of Sale of Commodities, but Mr. Baucom's friends in the North Carolina Legislature called it to his attention, and he was successful at that time in blocking and deleting it from the bill.

In view of the foregoing statements, I feel that this question of net weight markings on bar soap should be further reviewed, restudied, and examined by the National Conference Committee on Methods of Sale of Commodities, and that the standard specifications, as adopted by the ASTM and the American Standards Association for ordinary bar soap, be used as a guide.

In closing, let me also suggest that the Committee give full consideration to ASTM's standard specifications for all kinds and types of bar soap, chip soap, powdered soap, soap powders, and detergents, and that the ASTM specifications for soap and soap products and detergents of every description be used as a guide in determining how these products should be sold. The method of sale of these products definitely should not be eliminated from weights and measures supervision and control.

(After statements were made by J. T. Kennedy, J. G. Rogers, J. F. Blickley, and G. H. Leithauser, relative to the sale of bar soap by weight, the Conference voted to refer the matter back to the Committee on Methods of Sale of Commodities for further study.)

MACHINE MEASUREMENT OF MARKET MILK

By G. D. Scott, *Sales Manager, Pure-Pak Division, Ex-Cell-O Corporation, Detroit, Mich.*

A few weeks ago your Secretary, Mr. Bussey, extended an invitation to our Company, the Ex-Cell-O Corporation, Detroit, Mich., to have some one present a 15- or 20-minute paper on the subject, "Machine Measurement of Market Milk". As a matter of company policy, throughout the 16 years of our history in the dairy equipment business, we have always endeavored to cooperate with Federal, State, and Municipal officials concerned with our equipment, to the very best of our ability. It is, therefore, both a pleasure and a privilege to talk to you gentlemen on the announced subject this morning. However, these remarks will be confined to our own Pure-Pak equipment and containers, because our competitors use entirely different methods.

In Mr. Bussey's letter of invitation, he asked us to explain how Pure-Pak filling machines have been designed and built so as to enable weights and measures officials to satisfactorily seal them. Unfortunately, we find ourselves forced to tell you that, in our opinion, it is impractical to seal a Pure-Pak filling machine. This is true because of the great variety of products it must fill into so many different sized containers.

Under the circumstances, it seems not only proper, but vitally necessary, to briefly discuss at least the outstanding ramifications of the American dairy industry and its products. These are the factors directly responsible for the manner in which Ex-Cell-O Pure-Pak forming, filling, and closing machines are designed and manufactured. It will also be helpful, I believe, to briefly describe the various kinds and types of automatic, mechanical, equipment required by the dairy industry, as well as the various size packages currently used in the distribution of fresh market milk and its by-products.

A working sample of the most simple filling mechanism, in our Pure-Pak line, has been brought here for your personal inspection. Here, also, are actual samples of the various size Pure-Pak containers currently in daily use in the United States. There is a definite purpose for the remarks covering the products manufactured by milk distributors, the size containers in which such products are sold, and the various model Pure-Pak forming and filling machines. They will serve as a foundation for the later comments which are directly connected with your interests as Weights and Measures officials.

In the first place, if we were concerned here only with fresh liquid milk, as it comes from the dairy cow, our common problems would be most simple, indeed. However, in addition to the packaging and sale of raw, unpasteurized milk, the dairy industry also processess, packages, and distributes many additional kinds and types of dairy by-products. The major ones, of course, are standard pasteurized milk, which may have a variation in fat content of all the way from 3 to 5 percent or more. Then comes homogenized milk with its varying fat content. From there, we have skim milk with most all of the fat removed, but with all nonfat milk solids still remaining in the product. Then, there is buttermilk, both churned and cultured.

We also have the various types of chocolate drinks and chocolate milk itself. These are manufactured by adding various nonmilk solids, such as sugar, chocolate syrup, stabilizers, etc., to standard milk. Next comes light, medium, and heavy cream—on down through sour cream, yogurt, and cottage cheese. In addition, there are beverages, such as orange, grape, and other fruit drinks, also packaged by the dairy industry. Practically all these products have different characteristics. They definitely do not have the same viscosity, and they vary as to their water, fat, and solids nonfat content. They definitely vary in volume with the rise or fall in temperature, and most of them have different specific gravities. Just last week we rechecked the data compiled by our research department on this subject for the specific purpose of presenting it in this paper. Our technicians made additional in-plant tests in several dairies. They found they could pro-

duce a variation, between some of the above-mentioned products, of as much as 15 cm^3 per quart-size container. The average in three plants showed that, when the filler was set to fill a full quart of buttermilk, it actually metered out 1 quart plus 6 cm^3 of homogenized milk. This resulted from using buttermilk with gravity flow to the Pure-Pak filler.

However, when they tested a plant where the buttermilk was forced through the lines with a milk pump, thereby "beating" a certain amount of air into the products, then they found an actual differential of more than twice as much, or almost 15 cm^3. You will, of course, bear in mind that these results were deliberately produced for test purposes and did not reflect the regular plant operation.

As formerly mentioned, our common problem would be further simplified if we had only one size container with which to contend. The facts are, however, that varying segments of the dairy industry, throughout the country, supply dairy products in ½-gallon containers, quarts, pints, and ½ pints. In addition, cottage cheese is often sold in both 12- and 16-ounce containers. A great many industrial plants use ⅓-quart containers in States where such size containers are legal. Therefore, not only do we have complications by reason of varying viscosities of the numerous products we must handle, but additional problems are introduced because of the many carton sizes.

Again, our problems would be further reduced if there was only one model and one size of automatic filling and forming machinery involved. This goes right back to the dairy industry again. There are extremely large plants, such as Chevy Chase and Lucerne here in Washington. There are medium sized plants, and literally thousands of extremely small licensed milk distributors throughout the length and breadth of this Nation. It is impossible for all of them to use the same model and size filling machine, just as it would be impossible for them to use the same number of delivery trucks, boilers of the same horsepower, or the same size dairy buildings.

The result is that, over a period of years, in order to serve the industry and meet its demands, we have been forced to design and build midget size machines, junior machines, senior machines, half-gallon junior, and half-gallon senior machines. As a matter of fact, the number of machine models now run through the letters A to K, inclusive.

All these standard machines have been designed and built so as to enable the distributor to package all these products in all the sizes that have been mentioned. This operation begins with a flat piece of paperboard, at one end of the machine, and finishes with a filled and sealed container, ready for delivery to the consumer at the other end. All this is accomplished in one continuous automatic operation, without touch of human hands.

Now, what does all this add up to from a weights and measures viewpoint? It simply adds up, as we said before, to the basic fact that we think it impractical to seal a Pure-Pak filling machine and accurately measure all the sizes and all the products that we have discussed. Note carefully we have not said that this is impossible. We say that it is impractical from the viewpoint of everyone concerned, including, we most sincerely believe, weights and measures officials themselves.

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I tell you it is not impossible, because it is true that individual sealed stops could be made for certain groups of products whose viscosities are similar. This places the responsibility on the shoulders of an ordinary dairy plant employee to select the proper stop for the correct product viscosity group and to make the physical change. If this were done, it would further introduce and increase the element of human error and would, we earnestly believe, make the cure worse than the disease. We conscientiously feel that we would be placing tools in the hands of the machine operator that would tend to give him more opportunity for error than he now has in making the simple adjustment already provided on the Pure-Pak filler.

Under the conditions and circumstances that have been described, we believe that the present Pure-Pak filler and its simplicity of fill control is the most complete and satisfactory answer.

We think you can say, "Mr. Dairyman, you have a filler that will accurately measure the various dairy products you sell. We have inspected this mechanism and we have placed our stamp of approval upon it. From this point on, it is your responsibility to make certain that your containers are filled within the tolerances as provided by law."

Ex-Cell-O engineers and manufacturing people have the "know how" when it comes to designing and building precision, automatic, mechanical equipment. That is our business! We have been engaged in that business for some 30 odd years. The sample filler which you see here in front of you, we think, is excellently designed, and it is precision manufactured within close tolerances. If it is supplied with a given dairy product, at a constant temperature, this filler can be calibrated and set for a quart, and it will hold that measure, within 2 cm^3, plus or minus, for an indefinite period of time. However, no one can design a mechanical filler that can change the physical characteristics of milk and its by-products!

Perhaps some of you may feel that the following example is too far-fetched. Nevertheless, it will serve to illustrate some of the same physical differences with which we, here, are forced to contend within the dairy industry.

Suppose you very carefully calibrated and sealed a gasoline pump so as to accurately measure and deliver a full gallon of gasoline, no more, no less.

Now, suppose you took the intake line and placed it in a tank of SAE 30 motor oil. What do you think the result would be? We think you'd wind up with a short gallon of oil.

In addition, there are other rules and regulations promulgated by Federal, State, and Municipal health authorities in connection with the sanitary aspects of milk fillers. These require the complete dismantling and sterilization of such mechanisms at the end of each and every production run, whereas, when gasoline pumps are set and sealed, it may not be necessary to disturb them for long periods of time.

I would like to point out that we have some 1,600 individual Pure-Pak machines operating in dairies located in 48 States. Our first machines began to operate as far back as 1935. Throughout all these 16 years, 15 of which I have been on this job, to my knowledge we have not had complaints from more than four or five separate weights and

measures departments, Federal, State, and Municipal included. This is true even though dairies operating in Pure-Pak produced and sold more than 3,500,000,000 filled containers just last year alone!

A few State jurisdictions have already approached and are now handling this matter in what apparently is a very satisfactory and successful manner. In some instances, we are required, by State officials, to furnish them the serial number and model and description of each machine shipped into their State. They also require the name and address of the milk distributor that will use the filling equipment. A copy of the letter, bearing this information, goes to the local inspector. He, in turn, visits the dairy, checks the accuracy of the filler, after which he applies a tag or decal, which indicates that the measuring device is approved for the metering of milk products packaged and sold in that State.

There is now before the Legislature of the State of Wisconsin a bill which provides, in part, as follows:

> Cartons and other containers which do not serve or purport to serve as measuring devices—may be used for the sale of milk and cream at retail and wholesale IF they are filled by inspected measuring filler machines. Such measuring filler machines shall be regularly inspected by the Department.

Some States have sent weights and measures officials to our plants in Detroit. There they have inspected and thoroughly discussed the Pure-Pak filling unit with our manufacturing and engineering departments. Having satisfied themselves with the proper design and accuracy with which the filling unit meets required tolerances, they have issued a code number, which is printed on the Pure-Pak containers used in their jurisdictions. When any local inspector picks up a container so coded, he is immediately informed that the package was produced and filled by a mechanism which had received the approval of his State Department.

On behalf of our President and General Manager, H. Glenn Bixby, may I take this opportunity to extend to each and everyone of you gentlemen an invitation to visit our plants in Detroit, Mich. You will be more than welcome there, and you will be shown everything we have in the way of milk-filling devices. We have no secrets in that connection! And if any of you gentlemen have any ideas or suggestions as to how this situation can be handled in a manner better and more efficient than now exists, please understand that your ideas and suggestions will be most welcome at any time.

PREPACK MEAT COUNTERS

By J. T. Kennedy, *Director, Weights, Measures, and Markets, District of Columbia*

The development of new merchandising methods seems to always throw new problems into the path of the weights and measures official. The advent of the prepackaged meat counters is certainly no exception to this rule, for such counters have developed many problems not heretofore found, so frequently, in weights and measures operations.

The problems to which I will refer, in this paper, are the ones which we have found in the District of Columbia, but it is fair to

assume that the District of Columbia's problems will likewise be found in various States, counties, and other municipalities.

The number one problem is the question "What is to be done about shrinkage?" Are we going to consider shrinkage as an allowable tolerance—one weights and measures official thinks this should be the answer; or, are we to consider the loose blood and water in packages as part of "net weight"—another weights and measures official has expressed the opinion that this is the conclusion which should be reached; *or*, are we going to require that the package which is on display for sale shall contain the quantity that is indicated on the package?

The law governing weights and measures operation within the District of Columbia specifically provides for sale by "net weight". The local department has steadfastly held that loose or soaked up blood and water is not part of the net weight of the commodity offered for sale. We have heard some comments that this is not fair, for, if purchase is made at a service counter, such blood and water would be in the commodity purchased. We must admit that the last part of that statement is correct—that blood and water is sold over a service counter. However, we must not overlook the fact that, when the commodity was sold to the customer, it was sold on a net weight basis, and the further fact that the merchant's responsibility for loss of blood and water ceases at time of sale. There seems to be little difference between the merchant's responsibility in connection with the operation of a service counter and a prepackaged counter. The merchant operating a prepackaged counter is not responsible for loss of blood and water occurring after sale. However, he definitely must assume responsibility for the loss of such blood and water occurring prior to sale. Therefore, if it is the merchant's responsibility to maintain these packages in accordance with law, then it is our responsibility to determine that he is accepting his responsibility and maintaining these counters in accordance with good weights and measures policies.

There is some shrinkage in practically all kinds of meats, but especially is this true in connection with roasts, round steak, frozen products, poultry, hams, and certain other smoked products. I feel that there is an answer to this problem, but the procedure necessary for the development of this answer cannot, in my opinion, be demanded of the merchants. One large operating company developed a list of allowances to be made to cover shrinkage on various cuts of meats; the adoption of this list of allowances has definitely shown that these counters can be maintained in accordance with law. Conferences with representatives of other large operating companies resulted in similar lists being adopted for use in their stores. Since adoption of these lists, there has been a decided improvement in the maintenance of these counters. However, even with this improvement apparent, we must consider another problem.

This problem may not be considered as a direct concern of weights and measures officials, but most certainly the problem materially reflects, indirectly, into our operations. This being a fact, it is felt that the subject is one which we can discuss in this meeting and possibly procure some information along this line from representatives of food operators who may be present here today.

The problem is the hiring or placement of improperly trained and inexperienced personnel both in the supervision of prepackage count-

ers and the wrapping, marking, and weighing of commodities offered for sale on such counters. Locally, this matter has been discussed with representatives of large operating companies and also with owners of smaller operations. We have been told that the managers and weighers have been trained and are experienced in the operations of the merchandising method and qualified to operate the equipment.

No doubt these top bracket men are honest in making that statement. However, it is felt that many of the employees operating these counters have had neither a thorough nor a sufficient period of training; many are not familiar with the proper operations of the prepackage scale and have displayed this lack of knowledge in the presence of weights and measures men.

May I cite an illustration of what I am trying to bring to your attention. On May 8, just 2 weeks ago, while looking over a prepackage counter, I observed quite a number of packages of cut-up chickens—they had been on display over night—I weighed one and found a 1-ounce shortage—the owner could not understand this shortage, as the weighers had been instructed to make a 1-ounce allowance for shrinkage. The weigher was requested to demonstrate how the package was weighed. She did so, and here is what she did—move the indicating line back to what appeared to be an indentation in the chart. I asked her if that covered the tare weight as well as allowance for shrinkage, and her reply was in the affirmative, for the girl who showed her how to weigh had so informed her that this was a quick way to weigh. It so happened that the indentation mark was 1 ounce back of zero—therefore, no allowance had been made for shrinkage. Was this the girl's fault? Should she have been placed in the position of being embarrassed by our findings? Personally, I feel that the owner and the manager were to blame—they had failed to properly train this girl and failed to determine that she had sufficient experience to accomplish her task. To me, they were careless and unbusinesslike, and were so told.

Frankly, and I don't know how many will agree with me, I feel that this is a big problem, insofar as prepackage counters are concerned.

Problem three—How should we determine "net weight" of packages on display for sale? Everyone realizes that on clean packages this is not a problem, for you can determine the tare weight through the use of identical wrappings. However, let's consider wet and bloody packages, where some blood has soaked into the paper or water absorbed into the container. In the District of Columbia, we have been stripping the packages to determine the net weight of dirty packages. Recently, however, a weights and measures official questioned our right to so strip packages. If stripping of dirty packages is not the proper way to determine net weight, then I am at a loss as to the proper method. It is, of course, possible to purchase such packages and, if found short in weight, institute proceedings against the involved company. Frankly, I do not feel that this is the proper way to procure the confidence of merchants, and I am honestly of the opinion that, if merchants have confidence in us, we will gain more in the protection of the public.

If there is some other way to determine the net weight of dirty packages, I certainly, for one, would appreciate advice along this line.

Problem four—The installation of prepackage counters in small stores where turnover is not sufficiently large to cover decrease in the percentage of profit. There is no doubt that increased volume of business is necessary if prepackage meat counters are to continue in existence. Too many small operators are attempting to install these counters, resulting in meat, poultry, and frozen products staying on display too long, causing excess loss of weight through shrinkage. The net result of such operations is the cutting of corners on an overall basis. Continuous cutting of corners must necessarily bring about the type of business which will not produce the desired results necessary to protect the consuming public.

GENERAL COMMENT

In the District of Columbia, the Weights and Measures Department has been very patient and has attempted to understand, even so far as to try to find an answer for the problems encountered. We have received good cooperation from the majority of the concerns operating these counters. Notwithstanding this cooperation, we have found it absolutely necessary to place two inspectors, practically 100 percent of their time, on examination and inspection of prepackage counters.

There are about 60 such counters in the District of Columbia and, on the first round of inspections, we found the conditions of these counters deplorable.

Immediately after the last Conference, we began to call in representatives of the various concerns, one at a time. The first firm to visit the office, after reviewing the findings of the department, showed considerable concern and within about 30 days came up with an answer—an answer which has been laid before other concerns for their consideration and adoption. To date, five companies have adopted this program, which, while not yet perfect, most certainly has brought about a definite improvement in these counters. The program is very simple—a list of allowances to cover shrinkage and a definite course of training, not only for the weighers, but for butchers, managers, and supervisors.

It is our hope that, within the next 6 months, the prepackage counters in the District of Columbia will comply 100 percent with the policies and practices of weights and measures.

INTERSTATE PACKAGES

By Chas. Sattler, *Commissioner, Department of Labor, Bureau of Weights and Measures, State of West Virginia*

The first inkling we had that this Department was employing methods that are not common practice among the Departments charged with the enforcement of the laws governing weights and measures was when the representatives of several large packing concerns called at our office in Charleston, relative to some of their packaged products that had been found short of the weight represented and claimed that in no other State had their weights been called into question. Of course, this is a usual alibi, and you should be prepared to discount these statements.

There is, however, no mystery about our methods, there is no secret process, nor is there any question whatsoever concerning the efficiency

of our procedure. It is, as a matter of fact, quite simple. Our inspectors are under strict instructions to maintain a constant check on all merchandise packed in bags, bottles, boxes, cardboard containers, cartons, and cans, and to spot-check every brand of merchandise to determine whether it contains the quantity represented. If, in making this spot-check, the inspector discovers a short-weight container, he is then required to check the entire consignment with meticulous care. Each inspector is equipped with a Detectogram (I trust this will not be construed as a plug for that company) on which the check is made of the lightweight containers. Each and every bag, bottle, box, cardboard container, carton, or can that is found to be short of the quantity represented, either in weight, measure, or numerical count, is stamped "Underweight" illegal for sale, with a stamp which is part of the inspector's equipment, and all merchandise thus condemned cannot be sold by the retailer nor by the wholesaler, but is shipped back to the one person chiefly responsible, the packer.

Whenever an excessive or unusual quantity of any brand of merchandise is found to be short of the quantity represented, it is, of course, made known to the office through the inspector's report, and the information concerning this brand of merchandise and the shortage found is transmitted to all inspectors, either by letter or telegram if the situation warrants. Thus, within a period of from 24 to 48 hours, we stop the sale of all merchandise short of the quantity represented throughout the entire State. This procedure has been most effective and has probably done more to discourage the shipment of short-weight merchandise in the State than any device we have ever employed. Permit me to cite just a few examples without divulging the brand names. Just a few months ago, a certain brand of butter was found to have a shortage of from ½ to 1½ ounces to the pound. Following the procedure heretofore outlined, and within a period of 24 hours, approximately 75,000 pounds of that brand of butter had been found to be short in various parts of the State, and it was condemned and stamped as I have described. The manufacturer of the merchandise informed me that the cost of reprocessing the 75,000 pounds, plus all charges in connection therewith, was approximately $9,000.00, an amount far greater than any fine we could have imposed under our statute. This figure is no exaggeration, for, if you will follow this transaction in detail, you can readily appreciate how rapidly the costs mount up. First, there is the cost of freight or express from various locations in the State to the city in which the plant of the packer is located (which, incidentally, was in another State), which is no small item; second, the manual labor involved in unwrapping each of the four individual sticks which go to make up the pound, or 300,000 sticks in all; then the actual reprocessing and rewrapping, and finally the reshipping. These, of course, are the tangible costs. The intangibles can be better imagined than described. You can, for example, imagine the reaction of the local grocer when he, under the impression that he has an ample stock on hand, finds that large quantities are short of the quantity represented and cannot be sold; and, let me make this clear, his ire is not directed at the Department, for the sale of short-weight merchandise, bought in good faith by him, profiteth him nothing. As a matter of fact, the honest merchant has no desire to see his customers victimized. Then, you can imagine the

reaction of the wholesaler, who had the expense of delivery, of loading and unloading, and of picking up the merchandise that has been condemned. I have copies of letters in my file that were written to packers by wholesalers, in which they minced no words, but told them quite frankly that, if they could not or would not pack their merchandise to contain accurate weight, they would give their business to a dealer who would.

In another instance which occurred some few years ago, an inspector from this Department found 24 cans of pork and beans packed and labeled to contain 1 pound 8 ounces to the can which, when checked, indicated a shortage in the weight represented of approximately 3½ ounces. This shortage was fairly consistent in each of the cans. We then checked the distributor's stock and found he had 800 cases of the merchandise, with 36 cans to the case. The same shortage was evident in the stock he had on hand, and all inspectors were immediately notified to check all outlets in the State. Within 48 hours we impounded 3,500 cases of this brand, which was a nationally known brand, and the shortage in those 3,500 cases was well over 10 tons, not an insignificant item at approximately 15 cents a pound.

Representatives of that company came to Charleston by every known method of modern conveyance, and much of the merchandise was donated to charitable institutions, and the balance was shipped back and had to be relabeled to indicate the true weight.

In another instance that occurred just recently, we found a carload of flour in 10- and 25-pound bags, with a shortage of over 1 pound in the 10-pound bags and over 2 pounds in the 25-pound bags. In this case the local distributor was in dire need of the merchandise, and we approved an arrangement whereby the local distributor weighed each bag, filled it to contain the true weight indicated, and we supervised each detail and kept a record of the entire transaction. The correction of that condition cost the milling company over $800, because they agreed to pay for the time involved in reweighing, plus the loss of flour needed to fill to the true weight.

In each and every situation of this nature, we seize and retain a number of samples, so there can be no argument and no recriminations.

I am not exaggerating this situation, for the concern evidenced by packers of national repute and the special trips that have been made to the State by their representatives to discuss the problem offer abundant proof that they consider it quite serious.

The saving to the citizens of the State cannot be overemphasized, and, in a few instances where there were excessive shortages and in excessive amounts, the savings effected in a single instance was ten times greater than the appropriation to operate the Department.

In quite a number of cases and through the cooperation of weights and measures departments in other States, we have secured substantial refunds from the grower or packer when perishable merchandise was shipped to a wholesaler short of the quantity represented by a check of our inspectors when the aid of this Department was invoked by the merchant.

It occurs to me that what we are doing on a State level, and doing so successfully, could be done nationally by cooperation between States and by the exchange of information. It occurs to me that the National Bureau of Standards could well serve as the clearing house for this

type of information, and I am persuaded that, through the cooperation of the States along the line suggested, it would be but a short time, at least in the field of merchandising, before honesty would not only be the best policy, but it would be the only policy under which operation in this field would be possible.

(Following the presentation of his prepared paper, Mr. Sattler gave an interesting demonstration of short-weight packages, all of which had been shipped in interstate commerce, and all of which had been discovered by West Virginia inspectors within a period of eight weeks immediately preceding the Conference. The packages consisted principally of food items. However, some other commodities were included.)

(The Conference was recessed until 2:00 p. m.)

FIFTH SESSION—AFTERNOON OF THURSDAY, MAY 24, 1951

(J. E. Brenton, Vice President, presiding)

THE RETAIL POULTRY MARKET

By Malcolm W. Jensen, *Sealer of Weights and Measures, City of Madison, Wis.*

The retail poultry market has progressed during the past few years from a poorly controlled, weakly operated business, to a highly precisioned industry in need of special regulations.

The advent of the large killing and processing plants, along with the dry-pick and soft-scald methods of preparation and modern prepack merchandising, have brought poultry from the special-event dinner to the everyday, most any meal, class of food. Our chief interest in the market naturally centers around weights. The development of current and needed regulations and the problems of preparations, shrinkage and various methods of sale should, I believe, be considered here.

For the purpose of clarity of presentation, this discussion of the retail poultry market will dwell on chicken products only—although many of the points discussed will naturally hold true for other types of poultry.

The national annual per capita consumption of chicken has been steadily rising from 16.8 pounds in 1938—reached a high of 30.5 pounds in 1943, and has now leveled off at around 26 pounds. The high point of over one-half pound per person per week was reached during the days of meat rationing when chicken was bought as a meat substitute. About 37 percent of all chicken meat consumed annually in the United States is consumed in farm households. The sale of the other 63 percent is our concern.

The great increase in prepackaging in modern grocery merchandising methods has had a great deal to do with the increase in chicken sales as well as the increase in problems relative to weights and measures.

In Madison we have worked many years to discourage the advertising, weighing and pricing of chickens according to the method normally termed New York dressed. This, as you know, is the old standard method of advertising chickens at a given price per pound, weighing and computing them at the time of sale with only the blood and feathers removed and then drawing and wrapping them in a back room. It has been our contention that this method of sale is deceitful and offers too much opportunity for fraud.

Retailers have utilized a storage and preservative practice which is highly unethical but difficult to prohibit. It has been found that New York dressed chickens which are cooled and held in the water of a cooling vat for abnormally long periods of time will absorb water at

a reasonably even rate for an almost indefinite period. Birds which were kept in ice water for seven days absorbed an average of approximately 17 percent by weight. Some absorption takes place in the initial cooling process and is necessary to maintain a moist, freshly killed appearance. Dr. James Gwin of the University of Maryland has proved by experiment that the water absorption in this initial cooling varies from 3 to 6 percent and takes from 4 to 6 hours. He states that in most commercial operations the freshly killed birds are moved from the cooling vats sometimes within an 8-hour period. This produces a percentage weight gain which averages around 5.5 percent. It would seem that those distributors or retailers who hold poultry in wet refrigeration for long periods are violating the intent if not the letter of the law.

Another example of advantage taken of the New York dressed method is a small merchant in Wisconsin who was suspected, investigated, and convicted of a practice amazingly simple and effective and just as dishonest. This man supplied himself with a number of cylindrical pieces of lead. After advertising chickens at a price somewhat lower than his competitors, he would insert one of these lead weights into each of the fowl to be presented immediately for sale. The chicken would be weighed and computed in the sales room in front of the purchaser and then removed to the back room to be eviscerated and wrapped. The lead weight, of course, was removed and inserted into another chicken.

The development of the ready-to-cook method of sale presentation has been rather rapid. In our city we now have all large retail grocery and meat markets offering for sale dressed and drawn fowl. This evolution was sanctioned and hurried along by local and distant poultry processing plants; and, in turn, it brought about some weird experiments in weighing and labeling. First came those who would advertise the chickens at a dressed price, then draw each bird after having noted the weight and selling price of each before evisceration. Their labels would state that the items had been weighed and priced before drawing and would indicate such weight and dollar value. Then came those who would label the completely prepared chicken with three figures—dressed weight, drawn weight, and selling price. These methods were discouraged and the next development was the label which noted the net drawn weight and the statement of so much per pound before drawing, along with the total price. All of these methods were uncheckable from a weights and measures standpoint. We have now advanced to the point where ready-to-cook poultry is weighed, priced, and computed like any other meat product; that is, exactly as it is offered for sale.

You might be interested in the results of an actual price differential survey which we made in one store of a large retail grocery chain on a given date during April 1951. Just prior to this date, this concern had advertised ready-for-the-pan fryers, and they had on display in the prepack meat cooler many cut-up and whole chickens of various classes. We checked weights, prices, and computations, and learned that the total net average price per drawn chicken in the advertised fryer class figured exactly the same as the total average price of the dressed-only chickens in this class. We were somewhat surprised to find that this firm was adding on an average from three to nine cents

per pound more than was necessary to make the total average price of the drawn chicken equal to the total average price of the dressed chicken in various heavier classes of birds.

It would seem that we weights and measures officials have forced an adverse effect upon the purchasing value of the housewife's poultry dollar by insisting upon an honest and above-board presentation of weight and computation of this particular item. Be that as it may, I am convinced that competition eventually will force upon retailers a price per pound of any given item which is as low as is consistent with good merchandising operation.

Some retailers, though probably very few, still are advertising poultry on a live weight basis. This is done to reflect a grossly exaggerated low comparative price. No conscientious dealer is interested in this type merchandising, and no weights and measures official should condone it.

Through a definite consumer demand for eye appeal and choice of purchase, as well as the increase of consumer acceptance to self-service meats, the development of wrapping material which is used after the preparation of poultry products for retail sale has progressed from brown meat paper to transparent cellulose wrappers. The wrapper now most generally used is a cold meat cellulose or pliofilm which retains transparency and deters shrinkages of the product wrapped. Wrappers most generally recommended are those which are moisture-proof, coated, capable of being sealed by heat, and transparent.

Poultry has one definite peculiarity which seems to work to the advantage of good labeling practice and to make easier weights and measures enforcement. Chickens which have been prepared as ready-for-the-pan items quickly lose appearance under conditions of dry refrigeration. This loss of eye appeal apparently is directly proportional to the weight shrinkage of the product. Most markets in Madison have found it expedient to rigidly control the amount of poultry displayed for sale and to rewrap and relabel each day any poultry products which have been offered for sale in self-service, prepack refrigeration display cases. This natural deterioration process eliminates the possibility of storage of the product for much more than 4 days after the kill. Some retailers are counteracting the aforementioned rapid decomposition of their product by refrigeration under special conditions. It has been found that, if either whole or cut-up eviscerated chickens are stored in the refrigerator and completely covered with crushed ice with provision for good drainage, they can be attractive and salable for up to 7 or 8 days. The weight gain of eviscerated chickens during this ice storage will average about one-half of 1 percent per 24-hour period. Markets where these conditions prevail generally handle the poultry as most meat is handled—that is, weighed and computed at the time of sale.

A shrinkage factor of wrapped fresh poultry in a given class is difficult to determine. The natural shrinkage, even under the best controlled conditions of wrapping and temperature is somewhat variable. We have completed a rather comprehensive survey and have arrived at approximate figures of percentage of weight loss. They are offered here for your consideration. It was found that truly

fresh eviscerated and cut-up fryers and stewers, under near-perfect conditions of drainage, preparation, and dry storage, will shrink about one-fourth ounce per bird in each 24-hour period of display. This small shrinkage is obtainable only if the product is well drained and rewrapped each day. On the other hand, we have found an average total of 12-percent shrinkage on stewers and 5.5-percent shrinkage on fryers when they are not well drained and are wrapped and displayed in the original wrapper for the salable life of the products. The weight loss of an individual cut of a fryer averages 9.2 percent if not rewrapped.

A thorough search for laws, regulations, orders, or directives which have been enacted and are being enforced to cover any or all aspects of the poultry market exclusively was almost entirely unproductive. The Food and Drug Administration of the Federal Security Agency in an act of February 7, 1949, entitled "Federal Food, Drug, and Cosmetic Act and General Regulations for its Enforcement", has both general regulations to cover and provision for specific regulations. Chapter IV, Section 401, states in part, "Whenever in the judgment of the Administrator such action will promote honesty and fair dealing in the interest of consumers, he shall promulgate regulations fixing and establishing for any food, under its common or usual name so far as practicable, a reasonable definition and standard of identity, a reasonable standard of quality, and/or reasonable standards of fill of container." Section 402 of this Act, reads under subsection (b), (4), "A food shall be deemed to be adulterated if any substance has been added thereto or mixed or packed therewith so as to increase its bulk or weight, or reduce its quality or strength, or make it appear better or of a greater value than it is."

Under Section 403, titled "Misbranded Food", subsection (d) states, "A food shall be deemed to be misbranded if its container is so made, formed, or filled as to be misleading." This section also terms a food misbranded if it does not bear a label containing among other things an accurate statement of the quantity of the contents in terms of weight, measure, or numerical count; provided that reasonable variations shall be permitted by regulations prescribed by the Administrator. This section also states that the statement of the quantity of the contents of food in the package must be exclusive of wrappers and other material packed with such food.

Many letters were addressed to various officers in the Food and Drug Administration in an effort to determine if any variations from labeled weights or special regulations relative to poultry have been prescribed by the Administrator.

The reply of most value in this discussion was received from W. A. Queen, Chief of the Division of State Cooperation. Mr. Queen answered specific questions, parts of which will be quoted here.

I asked what specific regulations cover the information required to be on labels on wrapped poultry products. His answer I shall quote, "No specific regulations have been promulgated under the Federal Food, Drug, and Cosmetic Act stipulating the information that must be placed on the labels of wrapped poultry products. Poultry in package form is, of course, subject to the general labeling provisions of the Federal Act when shipped in interstate commerce."

To my question of what are the marking exemptions covering poultry when packed in synthetic casings, Mr. Queen stated, "No exemptions have been established for poultry when packed in synthetic casings. The requirement that such products bear quantity of contents markings is contingent upon whether they are in fact 'food in package form' as contemplated by section 403 (e) of the Act. The question is one which must be determined upon the basis of facts in the individual case."

The next question as to what weight allowance is made between the labeled weight and the actual drained chicken weight on canned whole chickens was answered by Mr. Queen as follows, "No regulations have been promulgated under the Federal Act stipulating allowances that will be made in the 'labeled weight and the actual drained chicken weight on canned whole chickens' in which a liquid substance has been used as a packing medium. We would regard the use of an excessive amount of such a packing medium in canned whole chickens as an adulteration and amenable to the general adulteration provision of the Federal Act. * * * In the case of whole chicken in gravy, when labeled as such, we would not object to a declaration of the combined weight of the chicken and gravy as the net weight of the packaged product. Such a product would, of course, be subject to the considerations noted above in respect to adulteration. In accordance with Food Inspection Decision 144, issued May 22, 1912, we hold that the chicken should, as nearly as is practicable, fill the container, and that the gravy should occupy only the space that would otherwise be unfilled."

Question number four asked if there is a maximum liquid allowance on frozen poultry; that is, the difference between the frozen weight and the net thawed and drained weight. Mr. Queen's letter answered, "In cases of frozen poultry it is our position that the declaration of net weight should be on the basis of the actual weight of the poultry, allowances being made for shrinkage losses in accordance with the regulations. While we have conducted no experimental work on frozen poultry, an allowance would be made between frozen weight and thawed weight due to normal losses in the thawing operation. No allowance would be made for added water as such."

NBS Circular 503 lists among other things the names of States and possessions which require markings on packages of foods—said markings to be accurate and informative as to the net content of said packages. This circular which was issued November 16, 1950, indicated that 39 States plus the District of Columbia and the territories of Hawaii and Puerto Rico require that packages of foods be marked with statements of net content. In addition, eight other States require that, if packages of food carry a content declaration, this declaration must be accurate.

With all of these regulations in mind, I would like to call your attention to the results of a great deal of research on packaged poultry products—still holding primarily to chickens. Leaving out for the time being, fresh poultry which has been packaged and offered for sale, we found the following: A very careful and accurate check on the contents of every brand of canned chicken available in Madison brought about some amazing conclusions. These cans which had labeled contents varying from just under two pounds to four pounds—

were labeled to contain various types of chicken in various stages of preparation, and were found to contain an average of exactly 54.7 percent chicken by weight and 45.3 percent liquids. The percentage by weight of the chicken in the tested cans varied from 57.8 percent down to 48.9 percent. Although price structure does not ordinarily enter into weights and measures discussions, it might be interesting to note that, at the time of these tryout weighings, the contents of these cans were averaging 50 cents per pound of the labeled weight. The average price per pound of eviscerated fresh chickens in similar weight and age classes was 68 cents. A housewife, in making a comparison for the most economical purchase, would buy the canned chicken as being about 18 cents per pound cheaper. Our tests proved that the actual price per pound of the canned chicken was close to 1 dollar, or over 30 cents per pound more than comparable fresh chickens.

The results obtained in experimentation with frozen chickens were more encouraging. We obtained a number of packages of various brands of frozen stewing chickens and frozen fryers. We checked the actual net frozen weight against the labeled frozen weight and found that, in general, these weights coincided. Occasional shortages were found, as were occasional overages. The frozen birds were then removed to a thawing temperature and allowed to drain as the thawing process progressed. The thaw was a natural one and took place in a room with temperature averaging 70 degrees. The thawed and drained chickens were carefully weighed and results recorded. We found that, on an average, the net drained weight of stewing chickens was 93.7 percent of the frozen weight, and that the net drained weight of the fryers was 91.6 percent of the frozen weight.

That part of the poultry industry which is furnishing frozen birds will be expected to offer only a well-drained product.

Technical Bulletin 768, dated April 1941, and issued by the U. S. Department of Agriculture, reports on the "Quality of Frozen Poultry as Affected by Storage and Other Conditions." Included in this report are percentage figures computed on the loss of weight in storage of frozen birds. The poultry used in this research was classified either light or heavy. The separation between light and heavy birds was made at the live weight of 5½ pounds—all birds over that weight being classed as heavy. These chickens were quick-frozen, and comparisons were drawn after they had been in storage at 20 degrees below zero on each anniversary for 3 years. It was found that birds in the light class lost 1.2 percent the first year, 1.16 percent the second year, and 1.19 percent the third year in storage. Heavy birds lost 0.98 percent the first year, 0.96 percent the second year, and 1.96 percent the third year.

The Eviscerated Poultry Committee of the Institute of American Poultry Industries met with Messrs. Fitzgerald and Callahan of the Chicago Office of Weights and Measures on May 4, 1948, to consider weight loss tolerances on retail packages of frozen poultry. Among the conclusions of this meeting were the following:

> Variations in original freezing methods and temperature, the length of time in storage, storage temperature and humidity, and care at retail levels make it difficult—if not almost impossible—to arrive at any fair average tolerance that might be applicable generally. This is, however,

industry's problem, and consumers must be protected against unreasonable differences. Even though it is impossible to prevent occasional, slight variations on individual packages, according to the law of averages, overweight packages in any given lot should balance out the underweight packages.

The committee did not, therefore, offer any specific recommendation on what figure the inspectors might use as a normal, reasonable tolerance, but they did point out that birds that are wrapped properly and handled properly in the retail store should show very little loss of weight.

I have been informed by Mr. Baker of New York and Mr. Rogers of New Jersey that an additional problem has arisen in their jurisdictions. Chickens of various sizes are completely prepared for eating and have been offered for sale at a price per bird. Some are stuffed with dressing and roasted and some are merely barbecued or roasted. This problem will undoubtedly work itself westward, so you will want to know that these men with their usual acumen have ruled that, I shall quote from section 8A of the Poultry Regulations of the State of New York, "Poultry is meat; and whether cooked or uncooked shall be sold or offered for sale by weight and not by the piece or head; when roasted, in advance of sale, the net weight shall include the stuffing or dressing."

The Division of Weights and Measures of the State of New Jersey likewise directed on September 12, 1950, that barbecued and roasted fowl shall be sold on the basis of avoirdupois net weight only and that sale by the piece be discontinued.

I am adding to this report, in order to make them a part of it, tables of shrinkages in preparation and weights of various cuts of chickens. These tables, of course, will not be read at this time.

It is not my intention to offer any recommendations as to actions by this Conference, but merely to report conditions as they now exist. Any actions should, I believe, come from committee or from the floor and only after discussion and consideration.

I would like to take this opportunity to express my gratitude to those members of this group, representatives from the industry, and officials of the Federal Government who so generously replied to my many inquiries.

Chickens.—Approximate weights of birds in various stages of dressing and drawing. Listed according to live weights. The figures are furnished to aid in estimating processing shrinkages and will vary according to quality, age, sex, and degree of improvement through breeding. Shrinkage is usually greater in younger birds and in lighter-weight birds.

Live weight	Weight of blood and feathers	Dressed weight		Head, shanks, feet, inedible viscera, int.		Drawn weight		Bone in dressed carcass		Weight of edible meat	
lb	*oz*	*lb*	*oz*	*lb*	*oz*	*lb*	*oz*	*lb*	*oz*	*lb*	*oz*
1	1.9	0	14.1	0	3.7	0	10.4	0	2.6	0	7.8
2	3.7	1	12.3	0	7.0	1	5.3	0	5.3	1	0
3	5.3	2	10.7	0	9.4	2	1.3	0	8.2	1	9.1
4	6.7	3	9.3	0	11.5	2	13.8	0	10.6	2	3.2
5	8.0	4	8.0	0	13.6	3	10.4	0	13.2	2	13.2
6	9.1	5	6.9	0	15.8	4	7.1	0	14.9	3	8.2
7	10.1	6	5.9	1	1.9	5	4.0	1	8.0	4	3.2

Chickens.—Approximate weight of cut-up parts eviscerated carcass (Rhode Island Reds) listed by the total eviscerated weight, furnished by E. H. McNally, U. S. Department of Agriculture, Bureau of Animal Industry.

Total eviscerated weight of carcass		Breast	Legs	Wings	Back and neck
lb	*oz*	*oz*	*oz*	*oz*	*oz*
0	12	2.80	4.11	1.81	3.38
0	14	3.36	4.78	1.97	3.82
1	0	3.97	5.50	2.16	4.30
1	2	4.51	6.18	2.34	4.75
1	4	5.12	6.90	2.51	5.23
1	6	5.68	7.57	2.69	5.66
1	8	6.29	8.30	2.86	6.14
1	10	6.83	8.96	3.04	6.59
1	12	7.44	9.70	3.23	7.07
1	14	8.00	10.35	3.41	7.52
2	0	8.61	11.09	3.58	8.00
2	2	9.17	11.74	3.76	8.45
2	4	9.76	12.48	3.94	8.93
2	6	10.32	13.14	4.11	9.38
2	8	10.93	13.87	4.30	9.86
2	10	11.49	14.53	4.48	10.30
2	12	12.37	15.26	4.66	10.78

Chicken Fryers.—630 killed by one processing plant—chickens bred and raised by same plant averaged in the preparation process as follows:

Live weights ranged from 2 pounds to 4 pounds, 12 ounces.
Average live weight---------- 4 pounds, 1 ounce.
Average New York dressed weight---------- 3 pounds, 9 ounces.
Average drawn weight---------- 2 pounds, 12 ounces.

U. S. REGULATIONS—WEIGHTS AND MEASURES

POULTRY, BY DR. P. J. BRANDLY, POULTRY PATHOLOGIST, PMA, U. S. DEPARTMENT OF AGRICULTURE

In order to keep the records straight, I think it is proper that you all know I have had an opportunity to read Mr. Jensen's interesting and thought-provoking paper. My remarks, therefore, will be aimed at answering some of the questions raised, and toward explaining the extent of the authority vested in the U. S. Department of Agriculture for requiring accurate weight statements.

It might be well to explain that the service of the Department's Poultry Inspection and Grading Division in the Production and Marketing Administration, under which this work falls, is furnished to members of industry on a voluntary basis and that those plants which operate under the Division's supervision reimburse the Department for all costs incurred.

The principle which has guided the poultry inspection work since its inception in 1928 has been to provide protection to the consumer and sanitary control to the industry. In order to assure the integrity of the product, a post mortem examination is performed on each carcass to determine its wholesomeness. All processing operations are supervised to see that the food is handled in a sanitary manner in a clean environment, protected from the many possible sources of contamination which attend its preparation, and to safeguard it as much as possible during distribution. This inspection also prevents, in so far as possible, fraudulent and misleading economic practices, including adulteration.

To guard against such misleading practices, a careful check on the labeling of the products bearing the inspection or grading mark must be made to see that it includes accurate net weight statements.

When considering labels for approval, we have always worked closely with the Federal Food and Drug Administration in order to be sure that all labeling requirements of the Federal Food, Drug, and Cosmetic Act are met.

The first question raised by Mr. Jensen that I am in a position to comment upon refers to the adulteration of the poultry carcass by soaking in water. Section 70.16 of the regulations provides that "any dressed poultry carcass weighing less than 8 pounds shall not be permitted to remain in a chilling vat or tank for longer than six hours, unless the water is drained. Any dressed poultry carcass weighing 8 pounds or more shall not be permitted to remain in a chilling vat or tank for longer than eight hours unless the water is drained. Any such poultry carcass, however, shall not be allowed to remain in a chilling vat or tank after the internal temperature of the carcass has been lowered to 36° F unless the water is drained."

The U. S. Department of Agriculture is heartily in favor of ready-to-cook poultry and has gone on record concerning this development in the industry many times. In official plants, poultry carcasses are prepared for distribution in various ways. One way is to ice-pack the eviscerated poultry in cracked ice and ship it to market in bulk containers. This poultry is then retailed across the counter and weighed at the time of sale. Much poultry is cut up in pieces and packaged in fiber boxes overwrapped with cellophane in order to prevent dehydration during storage. Some is quick frozen and sold in the frozen form. This type of poultry package constitutes a problem for the processor. The product must be kept moist or it loses its fresh appearance, and yet it must be drained sufficiently so that bloody water does not accumulate in the bottom of the package. The inspectors regularly check the net weight statements of such packages in order to be sure that they are accurate.

A condition occurs in poultry or other meat following freezing which I feel you should be made aware of. This condition or process is the loss of fluids from the frozen meat when it is defrosted. It is commonly referred to as "tissue drip" or "defrosting shrinkage". We do not have as accurate data on poultry as we do on other meats concerning the amount of this "defrosting shrinkage". However, Sair and Cook [1] found that "defrosting shrinkage" could be as high as 22 percent of beef cuts, and Ramsbottom and Koonz [2] found that the "defrosting shrinkage" varied from 4.5 to 9.9 percent under various conditions when steaks were cut from the carcass. The factors which influence "defrosting shrinkage" appear to depend upon the type of meat, age, amount of fat, and other physical factors, as well as the conditions under which it is frozen and the pH of the meat at the time it is frozen. We, assuming that it is necessary for 2 or 3 percent of water to be on the carcass in order to maintain its fresh appearance and to protect it from dehydration, conclude from the figures given by Mr. Jensen showing that he found the stewing chicken, after thawing and draining, weighed 93.7 percent of the frozen weight, that about 4.5 percent of "defrosting shrinkage" occurred in the birds of

[1] L. Sair, and W. H. Cook. "Relation of pH to Drip Formation in Meat." Canadian Journal of Research. V. 16, No. 9. September 1938.

[2] J. M. Ramsbottom, and C. H. Koonz. "Freezer Storage Temperature as Related to Drip and to Color in Frozen Defrosted Beef." Food Research, V. 6, No. 6. (November–December 1941.)

this class which he checked. The fryers would shrink approximately 6.5 percent because of "defrosting shrinkage". If the stewing chicken were placed in the container in the frozen state, there would be no loss to the consumer because the carcass would contain a normal amount of solids. Our experience indicates that the "defrosting shrinkage" has a content of from 3.3 to 3.97 percent of solids. We cannot, of course, expect to be able to figure just what the "defrosting shrinkage" from any frozen poultry would be. Therefore, I should like to ask Dr. Scott of the Bureau of Animal Industry what action the Meat Inspection Division has taken with respect to "defrosting shrinkage" on frozen-cut meats.

Mr. Jensen discusses the weight allowance which is made between the label weight and the actual drained chicken weight on canned whole chicken. As indicated previously, this matter has been discussed at length with the Food and Drug Administration. When the initial product was produced in cylindrical cans in 1946, that Administration issued the following warning with respect to this product: "In packing the product care should be taken that the can is not too large for the bird so as to result in an excessive quantity of broth."

It is my understanding that the net drained weight of a pound can of peas would be considerably less than a pound and that the interstices which are filled by the fluid in order to provide for properly sterilizing the product during processing are regarded in the same light as the fluid filling the interstices in other products.

Our letter to Irvine M. Levy, City Sealer, Department of Weights and Measures, Chicago, explains our position on the whole canned chicken product. We wrote Mr. Levy as follows:

> The marketing of whole chickens in cans has been given a great deal of study by this service, during which time we were able to consult and be guided by the comments of the Federal Food and Drug Administration. It should be clearly understood that the specified weights which are here given are not standards established by the Federal Food and Drug Administration but are weights which we believe to be practical. That Administration states that "cans no larger than that necessary to hold the birds should be used."
>
> We realize that birds of different conformation will vary in weight even though they are the largest size birds which can be placed in the can. It is impossible, of course, to get a sufficient number of birds which weigh exactly the same, to establish too arbitrary a net weight of the carcass going into the can.
>
> For the 404×700 size can the average raw eviscerated weight of the birds placed in the can should be 2 pounds, with a minimum weight of 1 pound, 12 ounces. For the 411×704 size can the average raw eviscerated weight of the birds placed in the can should be 2 pounds, 6 ounces, with a minimum weight of 2 pounds, 4 ounces. The 404×700 can has sufficient fluid added to the can to make it weigh 3 pounds, 4 ounces net. The 411×704 can has sufficient fluid added to the can to make it weigh 3 pounds, 12 ounces net.
>
> We have noticed in our experimental work that the raw eviscerated weight of the bird may not be an accurate indication as to the weight of the bird after it has been processed. We have been able to devise no better way to establish reasonable practice for this product than to weight the raw eviscerated birds just before they are placed in the can. Obviously the amount of fluid in the can will depend upon the weight of the bird placed in the can and the amount of shrinkage which the bird undergoes during processing.

There are no restrictions on the inter-state shipment of poultry except that such poultry shall comply with the provisions of the Federal Food, Drug, and Cosmetic Act. The amount of dressed poultry in-

spected by the Department last year was approximately 500,000,000 pounds. Besides the post mortem examinations performed on this poultry, supervision of the processing, packaging, and labeling of all inspected eviscerated poultry and prepared poultry food products was accomplished.

If there are any further questions that I can answer I shall be happy to do so, or to work out the answer to any questions that you may raise.

PACKING HOUSE PRODUCTS, BY DR. J. R. SCOTT, CHIEF, TRADE LABEL SECTION, BAI, U. S. DEPARTMENT OF AGRICULTURE

At your Thirty-fifth Conference held last year, I discussed the labeling of meat products. At that time, I attempted to define the Meat Inspection Division's responsibility with respect to the labeling of meat and meat food product prepared in establishments operating under the Federal Meat Inspection Service. Since the group was primarily interested in weights and measures, particular emphasis was placed on that phase of labeling.

When Mr. Bussey asked me to appear on the program this year, he suggested that I discuss in more detail some of the points that were raised following the discussion of the subject last year.

Following my talk last year, there was considerable discussion concerning the shrinkage that may take place in certain products between the time they leave the inspected establishment and the time that they arrive at the retail level. I realize that this presents a vexing problem for the State and local net weight officials. As you know, our jurisdiction over the preparation and labeling of meat and meat food product does not extend beyond the limits of the official establishment, and, since we have no control over the factors influencing the shrinkage occurring while product is being distributed to the trade, we can offer no help except to be sure that the product bears an accurate statement of quantity of contents when it leaves our jurisdiction. I hope that some day some one will come up with the solution to this problem. There was also some discussion concerning the weight of product in casings. The Federal Meat Inspection Service does not require product in casings to be marked with the net weight. From time to time, we receive inquiries as to what type of container we regard as casings. Casings may be of animal origin or they may be constructed of plastic film. The latter are commonly known as artificial or hydrocellulose casings. To qualify as a casing, the animal or plastic film container must be in tubular form prior to placing the product therein. In some of the jurisdictions that require the net weighing of product in casings, the weights and measures officials have raised a question concerning the tare weight. We have weighed various kinds and sizes of casings, and it is rare to find any weighing in excess of one ounce, so I believe the tare weight can be considered as a negligible factor. I brought a few samples of artificial casings with me. I have a slip of paper attached to each one showing the tare weight as well as the approximate capacity of the casing. If anyone is interested in seeing them, they will be found on the display table following this session.

In closing, I would like to remind you of the invitation I extended to you last year to call on our inspectors in charge of meat inspection in your various jurisdictions for the purpose of discussing mutual problems in connection with the labeling of meat and meat food prod-

uct. I feel that the better we understand each other's responsibility, the better equipped we are to serve the American public.

I wish to thank the officers and members of the Conference for the privilege of being able to meet with you again.

FOODS AND DRUGS, BY S. C. ROWE, CHEMIST, FOOD DIVISION, U. S. FOOD AND DRUG ADMINISTRATION

It is a real pleasure for me to participate with representatives of the Department of Agriculture and members of the Conference in this panel discussion on the net weight declaration on packaged meats and poultry. We need these discussions in order that all of us will have a better understanding of problems which are of mutual interest. As you know, the Federal Food, Drug and Cosmetic Act requires that the label statement of the quantity of contents be accurate and provides for reasonable variations. Mr. Bussey has asked me to speak particularly about these reasonable variations from the declared contents which are permitted under the law and also the enforcement of the net weight provision as related to the Meat Inspection Act. He also wants me to explain why no specific tolerance figures are set up in the regulations.

The permitted variations found in the regulations are of two general types: (1) such deviations from the stated weight or measure as are caused by ordinary and customary exposure after introduction of the article into interstate commerce; and (2) variations in weight, measure, or count caused by unavoidable deviations in weighing, measuring, or counting conducted in accordance with good commercial practice. The first type deals with packages which are not air tight. We are concerned here with moisture losses which we call normal shrinkage. Under the second type where there is the customary declaration of contents, the average of the packages comprising a specific shipment must not fall below the declared amount at the time of shipment and no unreasonable shortage in any package is permitted even if compensated for by overages in other packages. Where the minimum quantity is expressed, there is no allowance below the declared minimum.

Now, it is the problem of normal shrinkage which gives all of us more concern than any other factor in short measure cases. Under the Federal law the product should be full weight at the time of shipment into interstate commerce regardless of when it was packed or how long it was held before shipment. After the shipment enters interstate commerce, allowances for normal shrinkage are made by the government. The question immediately arises as to how much allowance should be made in any particular case. Some years ago a U. S. District court in the Startup Candy case held that the case "required proof as to what a reasonable variation was in shipments of like commodities in similar packages under the same and similar conditions as in the case on trial." For more than three decades the personnel of the Food and Drug Administration have been conducting shipping and storage experiments to determine how much loss in weight different products undergo under varying conditions. These shrinkage data are not available for distribution, but any Federal, State or local food and drug official is welcome to look over the file of this material at any of our field offices.

In the development of short measure cases for court presentation, the Food and Drug Administration undertakes to establish the shortage so that there will be no question about it in the minds of the judge or jury. This includes a plan for obtaining information in regard to the weighing practices of the firm at time of packing and data on the conditions of transportation and storage. It also calls for a representative number of weighings, a sample for the determination of moisture, and an adequate analysis of the data. Our inspectors are asked to obtain relative humidity and temperature figures and other data on transportation and storage. Figures on relative humidity and temperature during transportation are obtained from U. S. Weather Bureau records. The inspector ordinarily makes 50 gross weight field weighings selected at random and then submits a dozen of these 50 units to the laboratory for check weighings, gross, net, and tare. He also submits a sample for moisture determination. Based on the inspector's gross weighings and on his own laboratory gross and tare weights, the analyst calculates the shortage. The reviewing officer evaluates all of the data and recommends the action to be taken. If the moisture content found in the sample is normal for the product at the time of packing, the shortage cannot be attributed to shrinkage. If it is not normal, consideration must be given to the conditions to which the product has been subjected by comparing the data with experimental shrinkage studies of similar facts and circumstances.

When we come to a consideration of allowances for errors in weighing and measuring, our problem is much easier than in the case of shrinkage. Meeting an established label declaration might be appropriately compared to shooting a gun at a target. All of the shots will not hit the bull's eye. They will be scattered about in regular fashion; the better the markmanship and the more accurate the gun, the less the scatter. As we have said, in enforcing the Food, Drug, and Cosmetic Act, the Administration regards each shipment as a whole. In each shipment there must be as many units above as below the declared volume or weight and the variation from unit to unit must not be excessive. In short, the measuring equipment must be accurate and factory control must be in accordance with good commercial practice.

You will understand the consequent impossibility of setting up specific tolerances for this or that commodity. If specific tolerances were established, they would not be fair and equitable in all cases from both a consumer and industry standpoint. This is one reason why the regulations require a determination of the facts in each case. There is another very important reason. Unscrupulous manufacturers, and they are definitely in the minority, take full advantage of a tolerance. They subtract the tolerance from the declared weight and aim at that figure rather than the full declared weight. Honest manufacturers have to compete with these products and the consumer is cheated to the extent of the tolerance.

In interpreting the federal law we have always regarded the proviso for reasonable variations as being of a general rather than specific nature. Many years ago in the Shrevesport Grain and Elevator Co. case (287 U. S. 77) where the constitutionality of the net weight amendment was attacked, the U. S. Supreme Court held that the

meaning of the statutory words was not doubtful and nonenforceable as contended by the defendant. The Court pointed out that the regulations represented a long-continued practical construction of the Act on the part of those charged with its administration. In the opinion handed down, the Court stated among other things: "The effect of the proviso is evident and legitimate, namely, to prevent the embarrassment and hardships which might result from a too literal and minute enforcement of the Act, without at the same time offending against its purpose." And referring to the regulations, the Court said, "These regulations which cover variations as well as tolerances and exemptions have been in force for a period of more than 18 years with the silent acquiescence of Congress."

Before concluding, I should like to say a few words about provisions of the Food, Drug, and Cosmetic Act which are entirely separate but often confused with the net weight provisions. These are provisions dealing with the fill of container, and an adulteration provision which deals with the substitution of one ingredient for another. For example, in the case of whole chicken packed in broth, it would be possible for the container to be slack-filled and contain an excess of broth, even though the net weight were accurately declared. Since 1912 (F. I. D. 144) we have consistently held that the containers should be as full as commercially practicable of the food, in this case chicken, with only sufficient packing medium to fill the interstices that would otherwise be unfilled, without imparing the quality of the product. Under the present law, a slack-filled product might be misbranded either under the so-called deceptive container provision, as in this case, or under the provision which sets up a definite fill of container standard. If excess broth were present, the product would be adulterated in that there was a substitution of broth for chicken.

In connection with the enforcement of the quantity of contents provision of the Food and Drug Act as related to the Meat Inspection Act, I should like to quote in part Section 902 (b) of the law. "Meats and meat food products shall be exempt from the provisions of this Act to the extent of the application or the extension thereto of the Meat Inspection Act. . . ." It has been suggested that in certain instances neither law would have jurisdiction. I should like to correct this misunderstanding by saying that the Food, Drug, and Cosmetic Act is applicable to any meat or meat product shipped in interstate commerce where the Meat Inspection Act does not have jurisdiction. For example, if a product is held in storage after it leaves a B. A. I. inspected plant and shrinkage takes place so that it is short weight when shipped in interstate commerce, it is in violation of the Federal Food, Drug, and Cosmetic Act.

I have been necessarily brief in my remarks and have barely touched on many problems which have to do with quantity of contents. You may have questions, and I shall be glad to try to answer them. I hope you will feel free to contact me at my office here in Washington at any time and to visit any of the Food and Drug offices here or in the field for a discussion of quantity of contents problems.

REPORT OF THE COMMITTEE ON METHODS OF SALE OF COMMODITIES, PRESENTED BY J. G. ROGERS, CHAIRMAN

Preamble.—Your Committee on Methods of Sale of Commodities respectfully presents its report to this Conference for consideration and such action as may be deemed advisable in relation to its several sections.

We lay no claim to infallibility in reaching the conclusions that influenced the recommendations we now offer. Consistent with the policies of this Committee since its inception, we have conscientiously endeavored, through investigation and study, to determine the facts and the background of each issue brought to our attention and to deal fairly with them. We must maintain an open mind on the pros and cons of argument when issues become controversial, as they often do, with the purpose of coming up with the proper analysis that will lead to the greatest good for the greatest number—and this is the important factor in our deliberations.

Industrial and commercial interests do not always see eye-to-eye with us in our views. This mainly happens in instances where what we propose interferes with established customs of trade enterprises. We believe it has been conclusively proven through studies made by this Committee in the past that certain commercial customs, though of long years standing, were highly questionable if not altogether bad, and some of them more than bordered on the unethical. We would be failing in the purpose and principles of good weights and measures administration were we not to take steps to correct these. Where differences are minor, modified changes are sometimes all that are necessary, and in such cases a give or take position can be taken without detriment. We are conscious of the nuisance factor that reposes in changes affecting our business structure, and when there is no significant value or appreciable benefit to be had, we endeavor to avoid this. On the other hand, where an issue is important to honest trading and the preservation of equity in business we must not hesitate to act regardless of its inconvenience to enterprise.

Differences that may arise because of conflictions in opinions as between weights and measures officers and members of industrial and commercial groups, certainly should not be exalted, but rather should be arbitrated and settled by way of friendly cooperation and coordination, with each faction entertaining a conscious and sympathetic understanding of the problems and responsibilities of the other. This is the American way and represents America at work.

The following items received the attention of this Committee since the last Conference. The recommendations incorporated in relation to them and now offered for the consideration of this Conference, represent what we deem to be fair and proper solutions of the problems entailed in these various issues, as to methods of sale.

1. *Dacro P–38 Capping System for Milk Bottles.*—In January of this year, the attention of this Committee was drawn to a system of filling and capping for milk bottles developed by the Crown Cork & Seal Co., Dacro Division, Baltimore, Md.

The company in offering this to the dairy industry did not spare any means of making their proposition attractive, and as in most high-pressure sales programs laid particular emphasis on possible

savings. Their enthusiasm apparently led them into error, and into confliction with official viewpoints in relation to established requirements for filling methods at the dairy level.

Either by accident or intent they placed a misconstruction on code stipulations adopted by the National Conference on Weights and Measures and used extensively in the application of laws in the several States governing the sale and distribution of whole milk and cream. Specifically we refer to the Milk Bottle Code of NBS Handbook 44 wherein they confused testing temperature with filling temperatures for milk containers, with the result that what they were really in effect recommending to prospective and potential users of their system was the underfilling of bottles at refrigerated temperatures (usually 38° to 40°) on the presupposition that at the 68° temperature prescribed in the code as the testing temperature for capacity determinations, the contents would then be accurate. Their approach to this was quite academic in their apparent attempts to justify the proposal.

To the knowledge of this Committee the company did not seek a clarification or interpretation of the Code before launching the prospectus that they distributed among the dairies, but simply acted upon its own initiative and thereby created a situation that we feel demands action by the various jurisdictions wherein the indicated system may have been introduced.

There is variance in the laws of the several States relating to fill point for milk bottles. Some prescribe fill to the cap seat or stopple, others to a point ⅛ in. or ¼ in. below cap seat based on head diameters. None to our knowledge prescribe filling temperatures.

It is, therefore, the recommendation of this Committee that the proposal of the company responsible for this new development, to introduce filling temperatures into dairy operations be condemned and given no legal recognition, by reason of the confusing, questionable and undesirable situation this would create at consumer and enforcement levels.

2. *Homogenized Concentrated Milk in Single-Service Containers.*—Shall be considered under the classification of food in package form subject to net quantity marking requirements, and when sold in containers that are not of standard capacities based on the gallon or its binary subdivisions, the quantity declaration shall be in terms of liquid ounces; provided, however, that the contents of such packages may be declared in fractional terms of recognized standards but only when used in combination with or in addition to liquid ounce markings.

Note.—The issue to which this recommendation relates has become highly controversial and by reason of this was referred to your Committee for treatment. The situation this has created was brought about by a recent development in the dairy industry that proposes the concentration of whole milk to a 3 to 1 ratio by the extraction of water and the marketing of this product in paper containers of nonstandard capacities, such as ⅓ of a quart. The industry thus far has confined its representations to this size, which in effect simply means that when ⅓ quart of the resultant product is added to ⅔ quart of water it will be reconstituted to a full quart of milk. While they are in agreement that the concentrate comes under the category of milk products, they contend that it does not come under the definition of "milk" as normally considered in the application of statutes prescribing containers

of standard capacities and commonly known as "Milk Bottle Laws". They take the position that concentrated milk is neither milk nor cream in the accepted and true sense of these terms, and that regulation of the distribution and sale of this product properly falls within the scope of laws governing the sale of food in package form, subject to the marking requirements that such laws prescribe.

There are conflicting opinions on this matter. The weight of argument would, however, appear to favor the contentions of the industry that provided itself with legal interpretations from certain of the State jurisdictions before launching their project.

Some States have already dealt with or are now dealing with the issue. It has been definitely settled in at least one State as the result of an opinion handed down by its Legal Department. This opinion sustained the views of the industry.

The point on which this Committee's recommendation is now based is that in concentrating whole milk by the extraction of moisture its character is changed and it, therefore, becomes a processed product, bringing it within the category of other concentrated dairy products, such as condensed and evaporated milks which are distributed and sold in containers of variable sizes and subject only to marking requirements as to quantity of contents.

The Committee in pursuing its study of this matter has been informed that the Federal Food and Drug Administration will permit the expression of contents on containers of concentrated milk in terms of 10⅔ fluid ounces or ⅓ liquid quart, which would indicate recognition of its classification as food in package form without reference to standard container requirements.

We were further informed that in one State where this commodity was only recently introduced a dispute arose in relation to pricing and that a dairy group petitioned to have it placed in the whole milk class. This, we understand, resulted in a hearing by the Federal Marketing Administration, the decision or ruling of which is pending.

3. *Meats and Poultry in Plastic Wrappings and Casings.*—Shall be exempt from net quantity declarations at packing sources and shall be sold on the basis of actual net weight at time of sale; provided that each item of meat or poultry so wrapped or contained shall be plainly and conspicuously marked with the legend: "To Be Weighed at Time of Sale" and, where the weight of the wrapping or casing exceeds ⅛ ounce, the tare weight shall also be plainly and conspicuously marked for deduction to determine the net weight.

NOTE.—There is presently much confusion in relation to marking requirements for meats and poultry either packed or processed in such materials as cellophane, pliofilm, visking, and similar forms and types of patented wrappings and casings. Even at the Federal level as between two agencies of government there appears to be confliction in the interpretations of what may or may not be done to conform with existing laws. One agency apparently attempts to hold the line on the strict application of net weight marking for commodities so packed, while the other does not. Present-day methods of processing and packaging have, of course, brought about this situation. In view of existing conditions it would appear that a liberal interpretation by way of marking exemptions is probably the best course to follow for the commodities comprehended in this situation, because of the under-

lying reasons that have been advanced in justification. The always existing shrinkage factor is probably the most outstanding and incidentally the most troublesome in maintaining equitable declarations that will consistently represent the contents of items wrapped or encased as indicated, for what might be termed a reasonable length of time. Markings at packing sources, therefore, very frequently fail in their purpose and mean little when the package comes to ultimate final sale.

This Committee is, therefore, of the opinion that the modification of marking requirements which this recommendation proposes would serve the best interests of all concerned from the packer to the consumer, that it will solve the problem of eliminating the confusion and confliction that exists, and it is designed to accomplish that end.

Thought was directed toward this issue in a general statement of a former report of this Committee, but without any definite recommendation at that time. We now feel that, in view of prevailing circumstances, something specific should be done about it.

4. *Motor Oil in Sealed Cans.*—Shall be sold on the basis of the United States Standard gallon of 231 cubic inches, its multiples and binary submultiples; provided, that this commodity, when distributed in sealed containers, shall be recognized in the category of packaged products subject to being marked in a plain and conspicuous manner with net quantity declarations in terms of liquid measurement, without recognition of the container as a measure; and provided further, that the space provided in such containers for expansion of the product due to temperature variations shall not exceed the maximum requirement as may be determined or established for such additional space in containers of the various sizes employed in packaging and distribution.

Note.—This recommendation anticipates the results of a project now under way in the oil industry where a packaging committee has been working on a standardization program for oil drums, pails, and cans for packaged petroleum products. The Committee already proposes to standardize oil-can packages of the one-quart and the five-quart sizes, with the capacity of the one quart being fixed at 63.525 cubic inches (or 110 percent) and the five quart at 310.406 cubic inches (or 107.5 percent). These sizes would be acceptable under this recommendation for packaged oil.

Some years ago there was a proposal before the Conference to permit the use of oil measures of odd sizes, such as those of 5 or 6 quarts. The purpose was to provide measuring facilities that would accommodate the crank case capacities of motor vehicles and permit of a single filling operation with the use of one measure. This proposal was made in the days when motor lubricants were mainly dispensed from bulk. We would not and did not accept the proposal to standardize the 5- or the 6-quart measure as such, feeling that this would be a recession from established standards. Packaged oil is in a different category, where the contents of the package governs instead of the container itself. In view of established precedent in other packaged products it would appear that it is consistent to recognize the proposed development.

We are at the same time, however, maintaining our position that the standard gallon shall be the basis of quantity representations, as there would be a decided danger inherent in permitting deviations in this

respect, as motor vehicles are designed for oil capacities on the basis of the standard quart. We should always take a definite stand against the introduction of odd quantities in elements of fluid ounces not representative of established values by volume, should this be attempted.

The recognition of head-space in containers of packaged oil is a necessity and by reason of this is included in our recommendation, with the restriction as stipulated. We believe that the Committee of the industry can be depended upon to come up with the right answers in relation to requirements in this respect. Economy would dictate this in container construction. The larger the can, the larger the cost, and we believe it can safely be considered that the use of excess material beyond needs will be avoided.

5. *Popcorn.*—Shall be sold by avoirdupois net weight and, when in package form, the contents shall be so marked.

NOTE.—The National Association of Popcorn Manufacturers, Inc., with headquarters in Chicago, has placed itself on record as favoring the sale of this commodity by dry measure. They filed a rather exhaustive brief with this Committee in support of their proposal and in which they laid main stress on qualitative phases, dealing with nutritive values in comparison with other foodstuffs, moisture, and expansion propensities in relation to grades, all of which references are outside the scope of quantity regulation. Their problems in relation to packaging were also incorporated.

In giving consideration to the arguments advanced by the industry, the Committee could not find sufficient reason or cause why the principle of sale by weight should not be applied to popcorn as it is to other commodities in a similar category, such as puffed and popped wheat, puffed rice or any expanded cereal, for, after all, it must be considered that popcorn is in the cereal classification.

Manufacturers of other expanded cereals have not proposed the dry measure method of sale. They appear to be getting along all right with net weight determinations and finding no difficulty in conforming with requirements regarding them.

The general trend for some time past in weights and measures channels has been away from the sale of dry commodities by measurement, due to the questionable factors inherent in this method of quantity determination with its many pitfalls of fraud and deception. Proof of these has long since been established, as the archives of most weights and measures agencies will show. The weight method of sale is decidedly more accurately determinative and in the final analysis is the one in which most dependence can be placed. The popcorn industry has become quite an empire. According to a magazine article that appeared a short time ago, the annual sales amount to $250,000,000 in the United States. A business of that magnitude certainly deserves our notice and attention. In dealing with it, we should be consistently fair in not favoring concessions that have not been accorded other enterprises of the same character in our commercial structure.

6. *Plus (+) and Minus (−) Symbols in Quantity Markings.*—Such symbols shall not be used in connection with quantity declarations on prepackaged commodities.

NOTE.—Certain commercial enterprises recently launched the practice of using these symbols on prepackaged meats. The obvious pur-

pose was to get away from declaring fractional parts of the ounce. A reason not so obvious may have been to relieve themselves of effects resulting from shrinkages which would make reweighing and remarking necessary, especially when the supply put up in advance of sale exceeded anticipated sales demands and did not quickly move.

The practice if condoned could well be a subtle approach from a new angle toward the use of qualifying terms in quantity markings and would be tantamount to recognizing such words as "approximate", "average", "more than" or any other term that evades true marking, and which have long since been condemned in official channels. Fractional ounce values now have serious significance in our commodity structure and especially in such items as meats, by reason of the prevailing all-time high in prices. Fractional losses can, therefore, be of much consequence in relation to consumer economy.

7. *Charges for Rug Cleaning.*—The unit of measure for pricing rug cleaning services shall be the standard square foot of 12 by 12 in.

NOTE.—While this basis of pricing is in very general use by rug cleaners throughout the United States, there is a minority group still employing the 27 by 36 in. so-called "carpet yard".

The purpose of this recommendation is, therefore, to establish uniformity throughout the trade and at the same time definitely fix a unit basis of measurement that will be clearly understandable to the public and provide a ready means by which quantitative determinations of rug areas can be made by all concerned.

No justifiable reason has been advanced why the "carpet yard" as referred to, with its confusing aspects, should not be eliminated in relation to rug cleaning services.

8. *Mops and Mop Heads.*—Representations of weight for mops and mop heads shall be based upon and apply only to the textile or other material forming the mopping substance, and shall not include the weight of any wire, fastenings or other appurtenances used in constructing or holding together a mop or mop head or for attaching the same to a handle.

NOTE.—Herein we find another instance where an industry deems itself justified in basing its quantity representations on the over-all weight of a utility. Again the excuse of "established custom" is offered.

We cannot agree that the reasoning is equitably sound when, for instance, a mop marked 16 ounces actually weighs little more than 8 ounces in mopping material.

From a labeling standpoint, the combining of weights of everything that goes into the making of a mopping unit can be conducive to possible fraud. The represented weight should, therefore, cover the absorbent element of the mop itself and nothing else. The buyer or user is mainly interested in this factor and is entitled to know just what he is receiving in the amount of absorbent substance in a mop.

9. *Ice Cream and Ices on Sticks.*—Novelty items of ice cream and ices frozen on sticks and sold in package form shall have the quantity of contents declared in terms of avoirdupois net weight.

NOTE.—This recommendation comprehends such items as "Popsicles", "Creamsicles", etc., that have such wide distribution in the ice cream trade.

The practice of some manufacturers has been to declare the contents in terms of fluid ounces. From the standpoints of the consumer and the weights and measures officer, such representations are impractical. Let us consider this from two angles. First: The fluid ounce declaration does not readily lend itself to recheck by those most interested. Second: The product is not liquid, but is solid when sold, and its character more appropriately lends itself to avoirdupois weight determinations.

These novelty items are usually packaged in glazine wrappers. The containers, therefore, have no relationship to the quantity in the article itself, and could not be used in checking operations to which containers for boxed ice cream and ices lend themselves. Our proposal is entirely practical and reasonable. It would best serve the interests of all concerned and the ice cream industry would find little difficulty in conforming with it.

10. *Coffee in Packages for Hotels and Restaurants.*—It shall be permissible for packers and distributors of ground coffee who put this up in packages of nonstandard sizes for the exclusive use of hotels, restaurants and cafes, to eliminate net weight declarations on individual packages, provided, that the main package containing these individual units is plainly and conspicuously marked with the net quantity of contents in terms of avoirdupois net weight.

NOTE.—There is a general trend towards putting up coffee in packages of variable sizes to accommodate eating establishments in order to facilitate the preparation of beverage coffee to serve their trade. In the various methods of processing now in vogue, various types of utensils are used and a specified weight of ground coffee is generally prescribed for each filling. The individual packages of variable amounts are furnished to serve this purpose. The main interest of the user from an economic standpoint is the weight of the over-all package for which he pays. The use of quantity markings on individual units would, therefore, appear to have little value and can justifiably be abrogated as a nuisance requirement.

11. *General Comments.*

THREE-QUART TILL BASKETS.—This Committee proposes that the National Conference on Weights and Measures place itself on record as recommending to the United States Department of Agriculture the elimination of the 3-quart till basket from the list of legal standard containers, by reason of the possibilities for fraud and deception inherent in the use of these baskets through their deviation from the standard submultiples of the bushel. The dimensions of these containers are the same in all respects as the 4-quart till, with the exception of the height. Due to the deceptive appearance, they, therefore, can and have been represented as 4 quarts when used in selling commodities.

SUBVERSIVE ACTIVITIES IN RELATION TO WEIGHTS AND MEASURES LEGISLATION.—The Committee's attention has been drawn to a situation that, if allowed to develop, may result in very serious consequences. This entails what appears to be a strong movement on the part of manufacturing and commercial enterprises dealing in such essentials as bakery products, cordage and twine, soap products, and possibly others, to obtain special concessions in weights and measures statutes that will relieve them of the necessity of conforming with

established principles and practices both as to methods of sale and to marking requirements.

This situation was brought into focus in a State where legislation was in development to establish a State law on weights and measures and where certain interests seem to have already gained their ends. There are also probably spotted instances where State laws have been recently amended to accomplish the purposes of the special interests involved.

The purpose of this reference is to alert weights and measures officers everywhere to be on the lookout so that these subversive movements will not gain headway. They should see that their legislators are fully informed of the dangers inherent in deviating from established principles and policies that have stood the test of time in weights and measures channels for the good of all concerned.

(Considerable floor discussion followed the presentation of this Committee Report, especially in connection with Item 5, Popcorn. During this discussion, C. D. Baucom of North Carolina offered an amendment to this item of the report, as follows: "Provided that this shall not apply to popcorn sold for immediate consumption on the premises."

This amendment was voted down by the Conference and the Committee Report was adopted, with the exception of Item 2, Homogenized Concentrated Milk in Single-Service Containers, upon which action was deferred to allow further study by the Committee on Methods of Sale of Commodities.)

(The Conference was adjourned, to reconvene on Friday, May 25, 1951, at 10:00 a. m.)

SIXTH SESSION—MORNING OF FRIDAY, MAY 25, 1951

(J. E. Brenton, Vice President, presiding)

DR. LYMAN. J. BRIGGS PRESENTED

Dr. Lyman J. Briggs, formerly Director of the National Bureau of Standards and a former President of the National Conference on Weights and Measures, was presented to the Conference. Dr. Briggs greeted the delegates and guests and made a few extemporaneous remarks regarding the early activities of the National Bureau of Standards in the weights and measures field.

TESTING CORDAGE-MEASURING DEVICES

By H. H. Russell, *Chief, Scale Section, National Bureau of Standards*

For quite a long while, the Committee on Specifications and Tolerances of the National Conference on Weights and Measures, has had under consideration the development of specifications and tolerances, and the selection of a recommended testing medium for cordage-measuring devices. To assist the Committee, the Office of Weights and Measures of the National Bureau of Standards, undertook a study of these devices to determine a testing medium that is readily obtainable and convenient for use in the field, and that would yield consistent and sufficiently accurate test results to be suitable for the purpose.

It is the primary purpose of this paper to present a recommendation, based upon tests conducted at the Bureau, for a specific testing medium. However, it is believed that certain facts disclosed by these tests are of sufficient interest to be worthy of some detailed discussion.

The basic operating principle of cordage-measuring devices is the same as that employed in the design of fabric-measuring machines, both of which require that the material to be measured be passed between a "measuring" wheel and either an idling roller or smooth plate, the measuring wheel being connected by suitable gearing to the dial or dials which are graduated to register in terms of feet and inches the amount of the material drawn through the machine. In their present stage of development, these machines are not equipped with price-computing charts.

Obviously, for accurate performance, it is required that the measuring wheel remain constantly in contact with the material being measured, that the ratio of the gear train be correct, that the material being passed through the machine remain perpendicular at all times to the axis of the measuring wheel, and that traction between the surface of the measuring wheel and the material be sufficient to overcome, without excessive slippage, friction and inertia of the machine.

Inspection of machines submitted by two different manufacturers indicate that honest efforts have been made to meet these design re-

quirements; tests made indicate that most materials being measured by machines of this type are susceptible of measurement by this method with sufficient accuracy to meet the practical requirements. But, the tests also disclosed that the machines, in their present state of development, have certain limitations which may not properly be overlooked.

As part of this paper, there is included a tabulation of the results obtained during a typical test of one of these machines wherein five separate tests were made with each of six different commercially available materials. None of the materials selected for the tests are in any way unusual or of a nature that would prevent vendors from attempting their length determinations through utilization of a cordage-measuring machine. On the contrary, it is customary to measure these materials by that method even in some cases when the material is actually sold by weight, if the customer has requested a specific length of the material.

In the tabulation of results which follows, the sign of the errors was obtained by subtracting the machine indication from the quantity known to have been passed through the machine. Thus a minus (−) sign preceding an error value signifies an underregistration of the device and that the delivery was in excess of the amount indicated; a plus (+) sign indicates the opposite condition.

Material	Actual length	Errors				
		Constant rate			Intermittent	
		1	2	3	4	5
	ft.	*in.*	*in.*	*in.*	*in.*	*in.*
No. 16 stranded wire, braided cotton						
pair	25	+1¼	+1⅛	+1⅛	+1 3/16	+1¼
Do	50	+2⅜	+2⅛	+2¼	+2¼	+2⅜
Do	75	+3½	+3⅛	+3⅜	+3 7/16	+3½
Do	100	+4⅜	+4 1/16	+4 3/16	+4⅜	+4½
No. 18 stranded wire, twisted, cotton						
covered	25	−8¾	−12½	−9¼	−10⅛	−8½
Do	50	−21¾	−22⅞	−19⅞	−17 5/8	−15⅛
Do	75	−33⅛	−31½	−26¾	−23 5/8	−18½
Do	100	−45¼	−40 5/8	−35 3/8	−31	−24
½-in. Greenfield	25	−2¼	−2⅛	−¾	−¼	−1½
Do	50	−3	−2¾	−1⅞	+¼	−4½
1-in. manila rope	25	−2	−3¼	−3¼	−3⅜	−3¾
Molded (round) rubber-covered light						
cord	25	−⅛	−¼	−¼	−¼	−¼
¾-in. manila rope	25	−2¾	−1	−1½	−¾	−¾
Do	50	−3⅛	−2	−3⅜	−1¼	−¾
Steel tape, ½-in. wide, figures slightly						
below an otherwise smooth surface	25	+2	+2⅛	[a] +2	+2	+2
Do	45	+3½	+3½	[a] +3¾	+3¼	+3¾

[a] The third run was made at a constant and very fast rate.

The series of tests reported were made on a machine which had been modified by the manufacturer after a previously made test disclosed inaccurate and erratic performance. The modifications included alteration of the surface material of the measuring wheel to improve traction, installation of a guide intended to prevent the material from being fed under the measuring wheel at an improper angle, and a slight alteration of the circumference of the measuring wheel, a measure intended to compensate for the tendency of the machine to under-register some types of materials. The actual circumference of the wheel, which was designed and marked specifically for measuring

wire, was found to be one-eighth inch less than the nominal size that would be correct (12 inches) if neither slippage of material nor free spinning of the wheel occurred.

In all tests, convenient lengths of the material used were measured prior to the test by direct reference to a suitable length standard, and these length dimensions were confirmed by the same method upon conclusion of the tests to determine to what extent the materials had been stretched during the several passes through the machine. In all instances, length changes were found to be of no practical consequence.

The strands of the materials of relatively small cross section, fixture wire, for example, were marked at the 25-, 50-, 75-, and 100-foot points; shorter lengths of the more bulky materials were employed but these, too, were marked at convenient intermediate intervals in order to determine whether errors of indication were proportional to, or independent of, the length of the strand measured.

In order to simulate normal conditions of operations involving the use of a take-up reel upon which the material is wound after measuring has been accomplished, three tests, wherein the material was drawn through the machine at a fairly constant and slow rate, were made with each sample. Following this, each sample was drawn through the machine twice, a short length at a time, by the operator stationed at the machine, thus simulating conditions of normal operations wherein a take-up reel is not employed.

Analysis of the test data does not reveal that results of the "constant-rate test" and the "intermittent test" vary significantly, except in the case of twisted, cotton-covered No. 18 stranded fixture wire. Even in this case, however, it may be improper to ascribe significance to the differences noted, since all tests made with twisted material indicate clearly that these machines, in their present stage of development, will not satisfactorily measure material of this kind.

All tests made disclose that machines of this type perform best when materials of uniform cross section are used. Uniformity of cross section insures that the line of contact between the material and the measuring wheel and the line of contact of the material with the idling wheel or plate, as the case may be, remain parallel to each other. Poorest performance occurred when quite flexible, twisted material was used. The establishment of these facts clearly indicated that the testing medium selected should present to the measuring wheel a smooth surface, should be of uniform cross section, and of a nature to resist any tendency to pass under the measuring wheel at an angle other than 90 degrees.

It was therefore decided to investigate the suitability of steel tapes. Certainly, a steel tape meets the requirements of convenience and availability. It remained to be determined whether test results obtained through the use of a steel tape would be consistent.

Consequently, the test procedure outlined above was repeated, using a Chesterman-type cloth tape with longitudinal copper wires woven into the material, and two steel tapes of different widths. The Chesterman tape was found to be unsuitable because of its tendency to bunch and curl; a steel tape, ¼ inch wide, was not satisfactory because of its tendency to slip and pass under the measuring wheel at various angles. A steel tape measuring ½ inch in width was found to be satisfactory. Final tests, with a steel tape of this width, and having graduations

below the main surface of the tape, were made at the constant and intermittent rates employed during previous tests, and, in addition, at a relatively high-speed rate. These tests were highly satisfactory, as evidenced by the fact that errors of +2, +2⅛, +2, +2, and +2 inches on the 25-foot tests, and of +3½, +3½, +3¾, +3¼, and +3¾ inches on the 45-foot tests, were recorded. Thus, we find that the greatest variations from the mean errors were one-tenth inch and three-tenths inch on the 25-foot and 45-foot tests, respectively, and that the greatest variations between particular values were one-eighth and one-half inch, respectively, for the 25-foot and 45-foot tests. Moreover, the sign of the errors developed during the final tests is as it should be in view of the fact that the circumference of the measuring wheel of the particular machine was one-eighth inch less than 12 inches, although the gears and graduations were such that 1 foot was registered on the dial for each complete revolution of the wheel. Incidentally, the last makes it appear that the practice of making the measuring wheel less than 12 inches in circumference to compensate for slippage should be abandoned.

The test data obtained through the use of a steel tape as a testing medium will not be indicative of the accuracy with which these machines will measure all types of materials for which they are used. Consequently, the performance characteristics of these machines, when used for measuring various types of commercial materials, should be developed by tests made for type approval or other initial approval in a jurisdiction, using samples of the various commercial materials as testing media. Upon the basis of these special tests, it should be required that the limitations of the device be properly indicated on the machine.

The test data do, however, confirm that by using a properly selected steel tape as a testing medium, inaccuracies resulting from improper design, faulty manufacture, poor maintenance, and damage will be disclosed. It is therefore suggested that the Committee recommend the use of a steel tape, measuring not less than one-half inch in width, nor less than 50 feet in length, and having graduations below the main surface of the tape, as a standard testing medium for use in the field.

REPORT OF THE COMMITTEE ON SPECIFICATIONS AND TOLERANCES, PRESENTED BY J. P. McBRIDE, CHAIRMAN

During the course of the year, your Committee has had the various codes in Handbook 44 under study and has solicited suggestions as has been its practice in relation thereto.

It has not been necessary to hold an interim Committee meeting this year, and all matters have been handled by correspondence. Therefore, the first Committee meeting was held at the Wardman Park Hotel at 2:00 p. m., on Sunday, May 20, immediately preceding the Conference proper. The Committee will be in session for such length of time as is necessary to transact scheduled business at the meeting and will be on call of the Conference from that time on.

PROPOSED CODE FOR PREPACKAGED-ICE-CREAM MEASURE-CONTAINERS

Your Committee has considered one entire new Code on Prepackaged-Ice-Cream Measure-Containers. This code is offered for the reason that your Committee feels that this is a necessary supplement

to our Measure-Container Code. This latter code, as you will recall, is confined to a container intended to be used once only, to determine at the time of retail sale, the quantity of commodity comprising a *retail sale made from bulk supply* on the basis of liquid measure and to serve as the container for the delivery of the commodity to the customer. It will be noted that the proposed code is particularly directed to the commodity "ice cream" and it applies to the *prepacked* product, which in practically all cases would mean factory filled. It will be noted that a major part of the application of the Measure-Container Code is also in relation to ice cream.

You are well aware of the fact that ice cream presents to the weights and measures official a most difficult problem in the duty of rechecking to ascertain accuracy of measure to the consuming public. The product is highly compressible and permits practically no rehandling from the standpoint of withdrawing from a container. In this respect, it differs from other commodities. This difficulty is one of the principal reasons for the frequently proposed although unsuccessful legislation to compel the sale of ice cream by weight. Your committee feels, therefore, that under existing law the best means of meeting this situation is control over the container and to require that it be considered as a measure and subject to appropriate specifications and regulations in relation thereto. Several States already have laws governing approval of containers and exercise authority thereunder, including this type of package, and for the purpose of uniformity, this is an additional reason that a code should be established. Your committee presents the following code:

A. APPLICATION

A.1.—This code applies only to prepackaged-ice-cream measure-containers as defined. It does not apply to those items covered by the codes for Liquid Measures and Measure-Containers.

D. DEFINITIONS

D.1. Prepackaged-Ice-Cream Measure-Container.—A container intended to be used once only, to determine in advance of sale the quantity of ice cream, sherbert, or other similar frozen dessert, on the basis of liquid measure, comprising a wholesale or retail marketing unit, and to serve as the container for the delivery of the commodity.

S. SPECIFICATIONS

S.1. Capacities.—The capacity of a prepackaged-ice-cream measure-container shall be ½ liquid pint (8 fluid ounces), 1 liquid pint, 1 liquid quart, ½ gallon, 1 gallon, 2½ gallons, 3½ gallons, or a multiple of 1 gallon: Provided, That other capacities less than ½ liquid pint shall be permitted.

S. 2. Design.

S.2.1. Capacity Point.—The capacity of a prepackaged-ice-cream measure-container shall be sharply defined by (a) the top edge, (b) a graduation near the top edge, or (c) the lowest portion of a shoulder, cap seat, lid seat, or indentation near the top edge of the container; a graduation or indentation shall extend at least halfway around the circumference or across two opposite sides of the container. A prepackaged-ice-cream measure-container shall contain its indicated capacity without apparent distortion from its designed regular shape.

S.3. Marking.—A prepackaged-ice-cream measure-container shall be marked with a statement of its capacity in terms of one of the specified units prescribed in S.1. or, if the capacity is less than ½ liquid pint, in terms of fluid ounces; if the capacity is stated in terms of the pint or quart, the word "Liquid" or the abbreviation "liq." shall be included. The capacity statement shall be (a) on the side, (b) on that portion of the top fold which will be exposed to view when

the package is closed, or (c) both on the bottom and on the lid or cover of such containers as have removable lids or covers. If the capacity point is defined by a graduation, the container shall be marked on its side with a conspicuous and suitable statement clearly identifying this graduation as the capacity point.

T. TOLERANCES

T. 1.—Acceptance tolerances in excess and in deficiency shall be as shown in table 1.

TABLE 1.—Acceptance tolerances for prepackaged-ice-cream measure-containers

Capacity of prepackaged-ice-cream measure-container	Tolerance			
	In excess		In deficiency	
	Fluid drams	*Cubic inches*	*Fluid drams*	*Cubic inches*
½ pint or less	3	0. 6	1. 5	0. 3
1 pint	4	1. 0	2. 0	. 5
1 quart	6	1. 4	3. 0	. 7
½ gallon	9	2. 0	4. 5	1. 0
1 gallon	12	2. 8	6. 0	1. 4
Over 1 gallon	Add 12 fluid drams per gallon	Add 2.8 cubic inches per gallon	Add 6.0 fluid drams per gallon	Add 1.4 cubic inches per gallon

LINEAR MEASURE CODE

Amend paragraph S. 1., page 18, of Handbook 44 to read as follows:

S. 1. UNITS.—The total length of a linear measure may be subdivided into any or all of the following: Inches, feet, yards, and binary submultiples of the inch and the yard and integral multiples thereof. A 1-yard measure may also be graduated to show ⅓- and ⅔-yard subdivisions. Other subdivisions are allowable only on measures designed for special purposes and when required for such purposes.

This is a corrective amendment to clarify the wording of this paragraph in line with the formal Committee interpretation, which was rendered several months ago and published in the Scale Journal.

TENTATIVE CODE FOR CORDAGE-MEASURING DEVICES

We have made considerable study and experimentation with cordage-measuring devices in the light of the present Tentative Code and feel that it is necessary to amend this Tentative Code in the following particulars:

Amend the Tentative Code for Cordage-Measuring Devices by adding a new paragraph immediately preceding "P. PERFORMANCE REQUIREMENTS EXCEPT TOLERANCES.", page 26, of Handbook 44, to read as follows:

N. NOTES.

N. 1. TESTING MEDIUM.—A cordage-measuring device shall be tested with a steel tape not less than ½ inch in width nor less than 50 feet in length. The tape shall have a smooth surface or intaglio figures and graduations (that is, the figures and graduations shall not be raised).

Amend T. 1., page 27, of Handbook 44, by striking out the words "test material", in line 7 and insert in lieu thereof the following:

"steel tape".

With the approval of these two amendments, your Committee recommends the continuation of the tentative status of the Code for Cordage-Measuring Devices.

RECOMMENDATIONS OF THE SOUTHERN WEIGHTS AND MEASURES ASSOCIATION

The Southern Weights and Measures Association at their September 1950 Conference voted to submit to your Committee the following four recommendations:

1. That this Conference recommend to the Specifications and Tolerances Committee of the National Conference on Weights and Measures the adoption of a regulation permitting the chart on a prepackaging computing scale to be graduated back of zero not to exceed four ounces by graduations not exceeding the minimum graduations in advance of zero.
2. That this Conference recommend to the Specifications and Tolerances Committee of the National Conference on Weights and Measures the adoption of a specification to legalize Liquid Measures in sizes of five quarts, six quarts, and seven quarts in addition to present measures for the dispensing of motor lubricants.
3. That this Conference recommend to the Specifications and Tolerances Committee of the National Conference on Weights and Measures the adoption of an amendment to Scale Regulation R.5. striking out the word "retail". Regulation R.5. then would read "An uncompensated spring scale shall not be used for the sale of foodstuffs other than fruits and vegetables."
4. That this Conference recommend to the Specifications and Tolerances Committee of the National Conference on Weights and Measures that the excessive tolerance permitted by Scale Tolerance T.1.1.2. on a scale with a stabilized load-receiving element be eliminated. This tolerance should be re-examined by the National Committee.

1. In connection with the first of these four recommendations, the Southern Weights and Measures Association also requested that your Committee render an official interpretation of the present Code insofar as it relates to this recommendation. In order to facilitate this interpretation, we prepared three questions as follows:

I. Are weight graduations back of the zero graduation permitted on prepackaging computing scales?

II. If so, would these graduations be required to be the same as those on the main portion of the reading face or chart?

III. Is there any limit to the number of weight graduations that can be placed back of the zero graduation, if these are permissible?

The direct answers to these questions are as follows: I, yes; II, yes; III, no.

The following comments and explanations of these answers were offered by the Committee:

I. In the application of the H44 Codes, if a device complies with all specified requirements and is not in conflict with any provision thereof, it is assumed to be satisfactory. It is not the purpose of the Codes to spell out in detail all of the features which a device may have. It spells out only certain fundamental principles. It likewise spells out certain basic objectionable features, which a device should not have.

As to the matter of having weight graduations back of the zero graduation on a computing-type prepackaging scale, not only do we fail to find any prohibition of this feature, but on the contrary we find an implication in S.1.8.1. of the Scale Code that such arrangement is contemplated. S.1.8.1. reads as follows:

S.1.8.1. ZERO INDICATION.—There shall be a definite and clear zero graduation on an automatic-indicating scale whether or not the entire reading face is gradu-

ated, and on a balance indicator, and provision shall be made for giving an indication on either side of the zero graduation sufficient to show clearly an out-of-balance condition.

This specification takes into consideration the fact that automatic-indicating scales may have reading faces graduated throughout the 360° circumference of the reading face or chart. There are many such scales in use today. These include cylinder-type computing scales, industrial dial scales, and spring balances. Over-and-under scales also have weight graduations on both sides of the zero graduation. There is nothing new in having weight graduations back of the zero graduation on automatic-indicating scales, including computing scales. This is permissible under the H44 Code.

II. General Specification G–S.4.2.1. requires, among other things, that "In any series of graduations, corresponding graduations shall be uniform in size and character". Therefore, the weight graduations, back of the zero graduation on a prepackaging computing scale, would be required to be uniform with the other weight graduations on the same scale.

III. There is nothing in the Code that would limit the number of weight graduations back of the zero graduation. The entire 360° of the circumference of the reading face or chart may be graduated.

This Committee interpretation has been previously communicated to the Southern Association and, in order to accomplish as much dissemination as possible, request was made of the Scale Journal for space to publish it. This was readily granted and it appeared in the December issue of the Scale Journal.

In the matter of this specific recommendation, your Committee, after careful study, feels that no further action should be taken thereon.

2. In relation to Recommendation 2, it appears that the reason for the suggested additional sizes is to meet needs of vendors of lubricating oil in situations involving refill of crankcases. It is the Committee's information that in almost 90 percent of the cars the crankcase capacity is 5 quarts. Your committee undertook to make inquiry as to the demands for various size liquid measures from the manufacturers of such equipment and directed letters to 19 such companies. Eleven of these companies made no reply, and five of the companies who did reply indicated that they had abandoned manufacturing these items. Of the remaining companies, three manufacture a 5-quart measure, two manufacture a 6-quart measure, and but one manufactures a 7-quart measure. The demand for this size was so negligible that the company was not interested in the question.

It has been the fixed policy of weights and measures officials to endeavor to confine standards to already established sizes unless there was a very good reason for departure from such standards. It now appears that the 5- and 6-quart measures do have a definite field in the motor lubricating oil phase. The 7-quart measure as above indicated does not appear to be of too much moment. Your Committee, therefore, recommends the following amendment in the Liquid Measures Code:

Amend S.1. Units by inserting in line 3, page 40, of Handbook 44, following the words "one gallon," the words:

One and one quarter gallons, one and a half gallons,

The tolerances on these two additional sizes will be the same as the tolerances shown in table 2, page 42, of Handbook 44, for measures of 1-gallon capacity. (See G–T.4., page 14, Handbook 44.)

3. Recommendation No. 3 proposes the striking out of the word "retail" from scale regulation R.5., page 117, of Handbook 44. This would have the effect of making this regulation applicable to both wholesale and retail devices. The Committee has given this very careful consideration.

Regulation 5, as you know, is of rather recent adoption and came into being as part of the Conference program to further improve the so-called huckster type of scale. Thus far, industry as a whole has not made good progress in developing a scale to conform to the regulation in this particular field. Effort has been made and is continuing to be made to develop a satisfactory scale, and it is the feeling of your Committee that no change should be made in Scale Regulation 5, at least until such time as industry has accomplished compliance with the present regulation. This regulation, as you no doubt know, requires more than a compensated type of spring. Its effect is to place these scales in a different tolerance category, and the primary purpose of the regulation was consumer protection.

4. On Recommendation 4, which aims to eliminate the special tolerance on scales with a stabilized load-receiving element, your Committee has made a limited study of this question. This tolerance is a long-standing one and had good reason for its creation because of the then existing types of scale. On some of the newer types of scales this tolerance is not required. It is, nevertheless, a fact that many of the older types of scales still remain in use, which would be affected by eliminating this tolerance. Unfortunately, we have not had sufficient time to make a thorough and complete study of the entire matter and it is, therefore, the recommendation of your committee that this matter be further reexamined and action deferred until adequate study has been made.

LIQUID-MEASURING DEVICE CODE

In our Liquid-Measuring Device Code, it appears that a liberal interpretation of S.2.5. would preclude the use of the so-called predetermined or set-stop devices on tank truck meters. This device, as you doubtless know, permits the setting of the meter at a desired delivery figure and, when such figure is reached, a valve automatically closes and stops the flow of liquid, these valves being located either on the inlet or outlet side of the meter. This method of delivery has particular advantage in delivery of fuel oil to householders where the fill pipe of the household tank is located at some distance from the best accessible truck location, and the truck meter is, therefore, out of view. There is no sound reason why this arrangement should not be permitted as proper test can determine the accuracy of this predetermined device, and your Committee, in order to clarify this situation, recommends the following amendment:

Amend S.2.5. of the Liquid-Measuring Device Code, page 61, of Handbook 44, to make the second sentence thereof read as follows:

If the discharge valve is so positioned, any other shut-off valve in any portion of the discharge line leading to this outlet, shall be of the automatic or semi-automatic set-stop, or predetermining type, or shall be operable only (a)

by means such as a wrench or screw driver (but not a pin) entirely separate from the device, or (b) by mutilation of a lead-and-wire seal by which the valve is sealed open.

SCALE CODE

In the Scale Code, D.10. Ratio Test, the language therein may be considered as unnecessarily restrictive. A question has arisen in relation to this form of test on some scales where no counterpoise weights are employed. It is necessary that accuracy of the multiplying power of the levers be determined in some of these instances, and, to eliminate doubt on this point, your Committee recommends the following amendment:

Amend D.10. of the Scale Code, page 94, of Handbook 44, by adding the following sentence at the end thereof:

It is appropriate to utilize this test in the case of some scales not employing counterpoise weights.

Again in our Scale Code, N.1.5. SR Determinations, it is provided that an automatic-indicating element which is purely auxiliary to a primarily non-automatic-indicating scale and which may or may not be employed at the option of the operator shall not exempt the scale from the SR Requirements when the automatic-indicating element is disconnected or detached. This is construed to mean the conventional over-and-under indicator with graduations appearing thereon. In a number of instances so-called "balance indicator" attachments are similarly attached to scales, and it is the feeling of your Committee that such installations should also be subject to SR Determinations and, accordingly, the following amendment is recommended to the Scale Code:

Amend the second sentence of N.1.5., page 106, of Handbook 44, by adding the words "or balance indicator" at the appropriate places to make the sentence read as follows:

An automatic-indicating element or a balance indicator which is purely auxiliary to a primarily non-automatic-indicating scale, and which may or may not be employed at the option of the operator, shall not exempt the scale from the SR requirements when the automatic-indicating element or balance indicator is disconnected or detached; SR determinations may be made on such a scale with the automatic-indicating element or balance indicator disconnected or detached, and if such scale is one in which the weighbeam travel is in excess of that required by S.2.3.2., the SR determination shall be based upon the weighbeam travel required by S.2.3.2.

WEIGHTS CODE

It appears that under given circumstances an inconsistency in tolerance results can occur when counterpoise weights are employed on a scale having a high tip ratio of 1,000:1 or over as against permissive tolerances on the same total load determined on a weighbeam, reading face, or unit weight. The reason therefor lies in the tolerance on counterpoise weights in our Weights Code.

Some years back the Weights Code was simplified and in that process some of the refinements of the Code were sacrificed. Your committee realizes that this matter needs some consideration, but is aware of the fact that this is no easy task and contemplates the presentation of a paper on this problem at the coming Conference by the Mass Section of the National Bureau of Standards. As an immediate remedy, however, we recommend the following amendment:

Amend T.1. of the Weights Code, page 124, of Handbook 44, by changing the "period" at the end of the paragraph to a "colon" and adding the following:

Provided, That the maintenance tolerances for counterpoise weights for scales having a ratio of 1,000:1 or over shall be one-half the values shown in table 1.

PREPACKAGING SCALES

Some confusion appears to exist in relation to the application of the Scale Code with particular reference to so-called prepackaging scales. The question of whether or not "prepackaging scales" are "commercial equipment" has been asked.

Prepackaging scales are essentially used to determine quantity of commodity packed in anticipation of sale. In the self-service store, they serve a very useful purpose in expediting consumer transactions, and the scale employed is generally of the computing type.

In industrial establishments, a different style of prepackaging scale is employed. In some instances it is used to weigh every package, while in others it is used for spot checking and to correctly set operational functions where packaging machinery is employed.

G–A.1., of Handbook 44, defines commercial equipment as follows:

G–A.1. COMMERCIAL EQUIPMENT.—These specifications, tolerances, and regulations apply to commercial weighing and measuring equipment, that is, to weights and measures and weighing and measuring devices commercially used or employed in establishing the size, quantity, extent, area, or measurement of quantities, things, produce, or articles for distribution or consumption, purchased, offered, or submitted for sale, hire, or award, or in computing any charge or payment for services rendered on the basis of weight or measure, or in determining weight or measure when a charge is made for such determination. * * *

Sec 8, of Form 2, of the Model State Law on Weights and Measures reads in part as follows:

* * * it shall be his duty * * * to inspect, test, try, and ascertain if they are correct, all weights, measures and weighing or measuring devices * * * used or employed in proving the size, quantity, extent, area, or measurement of quantities, things, produce, or articles for distribution or consumption. * * *

Sec. 9, of Form 2, of the revised Model Law, as submitted by the Committee on Legislation on Thursday, reads in part as follows:

* * * It shall be the duty of the superintendent, * * * to inspect and test, to ascertain if they are correct, all weights and measures commercially used (1) in determining the weight, measurement, or count of commodities or things sold, or offered or exposed for sale, on the basis of weight or of measure, * * *

From these definitions, it is quite clear that prepackaging scales are "commercial equipment". They are used in establishing the quantity of things offered, or submitted for sale.

It is also to be noted that Scale Specification S.23. contains a provision which exempts the computing prepackaging scale from certain scale specification requirements in relation to the visibility of reading elements to the customer, and to the method of balancing.

Scale Regulation R.17 prohibits the use of this scale in direct sales to retail customers. This is further evidence that the code contemplates inclusion of prepackaging scales within its requirements.

To eliminate possible confusion concerning this point in the future, it is recommended that the Thirty-sixth National Conference go on record as approving this Committee's interpretation and officially recognize "prepackaging scales" to be "commercial equipment".

(During the presentation of this Committee Report, statements were made from the floor by J. G. Rogers, J. F. Blickley, C. M. Fuller, J. T. Kennedy, and R. E. Dorman, concerning recommendation number two of the Southern Weights and Measures Association with reference to 5- and 6-quart liquid measures. Statements were also made by J. T. Kennedy and S. Q. Bennett concerning recommendation number four of the Southern Weights and Measures Association referring to the special tolerance on shift test for small-capacity scales having stabilized load-receiving elements. Following these discussions, the report of the Committee on Specifications and Tolerances was adopted by the Conference.)

OPEN FORUM

F. M. Greene of Connecticut lead a discussion on Preheated Oils. Mr. Greene pointed out that No. 5 oil is metered and that No. 6 oil is weighed, in Connecticut. He said that the No. 6 oil is kept heated to a temperature of about 170° F. winter and summer. He stated that there are nine distributors selling No. 6 oil in Connecticut, that all are equipped with scales, and that all sell No. 6 oil by weight. Mr. Greene read the Connecticut law which requires that preheated oil must be sold, at retail, by weight.

J. P. McBride of Massachusetts made a motion that the method of sale of preheated oils be referred to the Committee on Methods of Sale of Commodities. After statements by C. D. Baucom and J. G. Rogers, pointing out the magnitude of the task that was being referred to the Committee, the motion was seconded and adopted by the Conference.

REPORT OF THE NATIONAL CONFERENCE COMMITTEE ON RESOLUTIONS, PRESENTED BY R. W. SEARLES, CHAIRMAN

APPRECIATION TO DIRECTOR AND STAFF OF THE NATIONAL BUREAU OF STANDARDS

Whereas, Dr. E. U. Condon, W. S. Bussey, and their very able and efficient staff have extended valuable assistance and guidance to this Conference, of which the Conference is very grateful; Therefore, be it

Resolved, That this, the Thirty-sixth National Conference on Weights and Measures, does appreciate such cooperation and assistance and wishes to make this resolution a part of the records of this Conference.

ON THE RETIREMENT OF R. W. SMITH

Whereas, R. W. Smith, who has been the very respected Secretary of this National Conference on Weights and Measures for ten years, lending his able and valued guidance to this Conference, as well as to many States and Sectional meetings on weights and measures; and

Whereas, we have been informed of his leaving the National Bureau of Standards and that he will no longer be the Secretary of this National Conference on Weights and Measures; Therefore, be it

Resolved, That we express to him our regrets that his connections with our Conference have been severed and that we extend our best wishes in his future undertakings, and that we wish him "Best of Luck, Ralph!"

APPRECIATION TO COOPERATING OFFICIALS

Whereas, the governing officials of the various States, Counties, and Municipalities, through their manifest interest in weights and measures work, have made it possible for their respective jurisdictions to be represented at this Thirty-sixth National Conference on Weights and Measures; Therefore, be it

Resolved, That this, the Thirty-sixth National Conference on Weights and Measures, does appreciate such cooperation and assistance and wishes to make this resolution a part of the records of this Conference.

APPRECIATION TO THE HON. JOHN RUSSELL YOUNG

Whereas, the Honorable John Russell Young, President of the Board of Commissioners of the District of Columbia added much to the success and enjoyment of our meeting by delivering a most cordial welcome to the City of Washington; Therefore, be it

Resolved, That this, the Thirty-sixth National Conference on Weights and Measures does hereby acknowledge its appreciation for the courtesy extended by Commissioner Young.

APPRECIATION TO THOSE PARTICIPATING IN PROGRAM

Whereas, various committees, speakers, and individuals have given generously of their valuable time and efforts to make this, the Thirty-sixth National Conference on Weights and Measures, a success; Therefore, be it

Resolved, That the Thirty-sixth National Conference on Weights and Measures does hereby record its grateful appreciation to all who have contributed to the success of this Conference.

APPRECIATION TO THE PRESS, RADIO, AND THE SCALE JOURNAL

Whereas, the press and radio of the City of Washington have been generous in reporting the activities of our present meeting;

Whereas, the Scale Journal has likewise been generous in publishing news and advance notice of our present meeting; Therefore, be it

Resolved, That this, the Thirty-sixth National Conference on Weights and Measures, does hereby record its appreciation to the press and radio of the City of Washington and to the Scale Journal.

APPRECIATION TO WASHINGTON BASEBALL CLUB

Whereas, the Management of the Washington Baseball Club of the American League did furnish tickets for the baseball game to the members of this Conference; Therefore, be it

Resolved, That this Thirty-sixth Conference on Weights and Measures go on record showing our appreciation for this fine gesture, and furthermore, be it

Resolved, That our Secretary send the Washington Baseball Club a letter of appreciation from this Conference.

APPRECIATION TO MANAGEMENT OF HEADQUARTERS HOTEL

Whereas, the Management of Wardman Park Hotel has done everything within its power to make our Conference a success; Therefore, be it

Resolved, That this, the Thirty-sixth Conference on Weights and Measures, does express its warmest appreciation and thanks to the Management of the said hotel for their cordial hospitality and cooperation during our meetings; and be it further

Resolved, That the Secretary of the Conference transmit a copy of this resolution to the Management of the Wardman Park Hotel.

ON THE APPOINTMENT OF A CHAPLAIN

Whereas, the National Conference on Weights and Measures opens with an invocation and whereas, by a Resolution of the 1949 Conference that a Memorial Service be held on the first day of each Conference; Therefore be it

Resolved, That a chaplain be appointed by the President of the Conference to serve each year during the Conference to act in that capacity.

ON FOOD PRICING CHARTS

Whereas, it has been called to the attention of this, the Thirty-sixth National Conference on Weights and Measures, that a price chart has been published by the Food Topics Magazine which is not in keeping with the principles of this Conference, in that it is misleading, permitting possible mark-ups in the prices of foods; Therefore, be it

Resolved, That this Conference go on record condemning the use of this or any other chart or charts which do not state accurately the price to the nearest one-half cent; and be it further

Resolved, That this Committee recommends that weights and measures officials enforce the principle of this Resolution in their jurisdiction.

ON SALE OF COMMODITIES BY NET WEIGHT

Whereas, it has been called to the attention of this, the Thirty-sixth National Conference on Weights and Measures, that certain jurisdictions are permitting the use of gross weights in the sale of commodities; Therefore, be it

Resolved, That this Conference go on record suggesting, in the interest of uniformity, that all jurisdictions adopt laws and regulations specifically stating that any commodity sold on the basis of weight shall be sold on the basis of net weight only.

ON ALLOCATION OF MATERIALS FOR WEIGHING AND MEASURING DEVICES

Whereas, it has been called to the attention of this, the Thirty-sixth National Conference on Weights and Measures, that there are prospects of a shortage in the allocation of materials to the manufacturers of weights and measures equipment; Therefore, be it

Resolved, That this Conference go on record as requesting satisfactory supplies of commercial weighing and measuring devices to fulfill the requirements for expanding business establishments and for replacements of such devices which are beyond repair, and

Furthermore, That this Conference ask that substitutions not be required of the metals and other critical materials normally used in the operation and functional parts of commercial weighing and measuring devices.

ON SPECIAL PROVISIONS TO EXEMPT SPECIFIED PRODUCTS FROM WEIGHTS AND MEASURES LAWS

Whereas, it has been called to the attention of this, the Thirty-sixth National Conference on Weights and Measures, that certain industrial groups have used pressure to exempt their products from the provisions of weights and measures laws in certain localities, thereby creating an unjust situation; Therefore, be it

Resolved, That this Conference go on record condemning such practices and use every possible honorable means to prevent such further practices in the future.

IN MEMORY OF MARK J. J. HARRISON

Whereas, with the passing of Mark J. J. Harrison in March of this year, those connected with weights and measures have suffered a great loss. Mr. Harrison was connected with the National Bureau of Standards for two years, later entering into scale work in railroading. He maintained his interest in weights and measures work throughout his years, appearing before many State and Regional meetings, as well as on programs of the National Conference. He was also past President of the National Scale Men's Association. And

Whereas, Mr. Harrison always gave liberally of his time and talents to the advancement of weights and measures work; Therefore, be it

Resolved, That this Thirty-sixth National Conference on Weights and Measures does hereby officially express its sorrowful regret at the passing of Mr. Harrison.

ON THE ADOPTION OF HANDBOOK 45

Whereas, there is now available at nominal cost a comprehensive and authoritative reference on measuring equipment, to wit, National Bureau of Standards Handbook 45, entitled "Testing of Measuring Equipment"; Therefore, be it

Resolved, That this body adopt Handbook 45 as its official manual for weights and measures officials in the inspection and testing of measuring equipment.

(Signed) R. W. Searles, *Chairman.*
E. R. Fisher,
J. J. Levitt,
M. A. Nelson,
A. C. Samenfink,
J. Fred True,
E. C. Westwood,
Committee on Resolutions.

(The report of the Resolutions Committee was adopted by the Conference.)

REPORT OF THE NATIONAL CONFERENCE TREASURER, GEORGE F. AUSTIN, JR.

		May 1, 1951
Balance on hand May 1, 1950		$309.46
RECEIPTS:		
May 26 Registration fees—1950 Conference 238 @ $5.00	$1,290.00	
Interest accrued	7.08	1,297.08
		1,606.54
DISBURSEMENTS:		
May 25 Social evening Wardman Park Hotel		
Buffet lunch 250 @ $2.00	$500.00	
D of C tax	10.00	
Punch, 9 gal. @ $14.00 gal	126.00	
D of C tax	2.52	
Waiters' service	62.50	
Public address system	10.00	
Music	120.00	
Entertainment of ladies (trip to Mount Vernon)	96.64	
Mimeographing, registration, and projection service	35.00	
Phone service	1.00	
Material handling and miscellaneous expense	5.89	
Receipt book	.52	970.07
Balance on hand May 1, 1951		636.47

Respectfully submitted,

(Signed) GEORGE F. AUSTIN, *Treasurer.*

(The Treasurer's report was adopted by the Conference.)

(Upon motion of L. E. Witt, the Conference voted to authorize the Secretary to draw upon the Treasury to pay the customary and usual expenses of the Conference.)

REPORT OF THE NATIONAL CONFERENCE COMMITTEE ON NOMINATIONS, PRESENTED BY J. A. BOYLE, CHAIRMAN, AND ELECTION OF OFFICERS

The Committee met on Thursday afternoon and voted unanimously to submit the following nominations for office in the National Conference to serve during the ensuing year, or until such time as their successors are elected:

OFFICERS

For President: E. U. CONDON, Director, National Bureau of Standards.
For Vice Presidents: E. R. FISHER, of Rhode Island; R. D. THOMPSON, of Virginia; J. F. TRUE, of Kansas; ERLING HANSEN, of Minnesota; J. A. BERNARD, of St. Louis, Mo.; G. H. LEITHAUSER, of Baltimore, Md.
For Secretary: W. S. BUSSEY, National Bureau of Standards.
For Treasurer: G. F. AUSTIN, JR., of Detroit, Mich.

EXECUTIVE COMMITTEE

For members of the Executive Committee: A. H. DITTRICH, of New Hampshire; WILLIAM KIRK, JR., of Nassau County, N. Y.; S. H. SEIGHMAN, of Pennsylvania; C. C. MORGAN, of Gary, Ind.; J. W. REESE, of Iowa; J. P. MCBRIDE, of Massachusetts; D. M. TURNBULL, of Seattle, Wash.; G. S. SMITH, of Cape May County, N. J.; J. R. JONES, of South Carolina; A. J. MAYER, of Louisiana;

C. H. Oakley, of Wyoming; Robert Slough, of Akron, Ohio; W. A. Kerlin, of Alameda County, Calif.; Robert Zierton, of Racine, Wis.; John I. Moore, of North Carolina.

Respectfully submitted.

(Signed) J. A. Boyle, *Chairman*,
J. E. Brenton,
C. D. Baucom,
H. E. Howard,
R. E. Meek,
C. C. Mundy,
L. E. Witt,
Committee on Nominations.

(The report of the Committee on Nominations was adopted and the officers were elected unanimously.)

(Near the conclusion of the Conference, the Conference, upon motion of J. F. Blickley, extended to W. S. Bussey, Secretary, a rising vote of thanks for the manner in which the meeting had been arranged and conducted.)

(R. W. Searles closed the meeting with prayer, and the Thirty-sixth National Conference on Weights and Measures adjourned at 12:27 p. m.)

Secretary's Note.—Immediately following adjournment of the Conference, a meeting of the new Executive Committee of the Conference was held. This meeting was attended by 14 of the 24 members. The following decisions were made with respect to the Thirty-seventh National Conference on Weights and Measures:

The Conference will extend over four days, with two sessions on the first day, one session on the second day, two sessions on the third day, and one session on the fourth day.

The dates for the Conference will be May 20, 21, 22, and 23, 1952.

The headquarters for the Conference will be Wardman Park Hotel, Washington, D. C.

A tour of National Bureau of Standards laboratories will not be scheduled on the program, but such a tour will be made available to those wishing to participate on the afternoon of the second day of the Conference, provided that suitable arrangements for this can be made with the National Bureau of Standards.

The morning session on the second day of the Conference will be held at the National Bureau of Standards if suitable arrangements for this can be made with the Bureau. Other sessions of the Conference will be held at the headquarters hotel.

The customary informal Conference party will be held on the evening of the second day of the Conference.

Some form of special entertainment will be provided for the ladies attending the Conference.

In lieu of the oral presentation of State and Association reports, as was the custom prior to the Thirty-sixth Conference, States and Associations will again be invited to submit reports, limited to two double-spaced typewrittten pages, to the Conference Secretary not later than May 1, 1952. Reports so submitted will then be mimeographed and assembled as a file of State and Association Reports, copies of which will be made available for distribution at the Conference. "Introductions" of officials will be made as a substitute for the program items of State and Association Reports.

J. Fred True of Kansas was elected to act as Attendance Chairman during the ensuing year. The Executive Committee will make a special effort to increase the Conference attendance at the Thirty-seventh National Conference.

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NATIONAL CONFERENCE ON WEIGHTS AND MEASURES REPORTS

Misc. Pub.	Year	Price	Misc. Pub.	Year	Price
4	1905	OP	74	1926	OP
5	1906	OP	80	1927	45¢
6	1907	OP	87	1928	35¢
7	1908	OP	101	1929	30¢
8	1910	OP	116	1930	35¢
9	1911	OP	129	1931	50¢
10	1912	OP	156	1935	OP
11	1913	OP	157	1936	20¢
12	1914	OP	159	1937	OP
13	1915	OP	161	1938	30¢
14	1916	OP	164	1939	25¢
41	1919	OP	167	1940	55¢
43	1920	20¢	170	1941	35¢
48	1921	20¢	186	1946	40¢
51	1922	15¢	189	1947	40¢
55	1923	30¢	195	1949	35¢
59	1924	35¢	199	1950	50¢
70	1925	50¢			

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